California. Dept. of Fish and Game.
Biennial Report 1924-1926.
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BIENNIAL REPORT

OF THE

FISH AND GAME COMMISSION

OF CALIFORNIA

1924-26

Dept of Fish & Game

California. Dept. of Fish and Game.
Biennial Report 1924-1926.

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STATE OF CALIFORNIA

Fish and Game Commission

TWENTY-NINTH BIENNIAL REPORT

For the Years 1924–1926

CALIFORNIA STATE PRINTING OFFICE
JOHN E. KING, State Printer
SACRAMENTO, 1927

48323

BOARD OF FISH AND GAME COMMISSIONERS.

POSTAL TELEGRAPH BUILDING. SUTTER 6100.

SAN FRANCISCO, CALIFORNIA.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of Governor. No compensation.

I. ZELLERBACH, President----------San Francisco
M. J. CONNELL, Commissioner----------Los Angeles
RALPH H. CLOCK, Commissioner----------Long Beach
B. D. MARX GREENE, Executive Officer and Attorney----------San Francisco

DEPARTMENT OF PATROL.

J. S. HUNTER, In Charge----------San Francisco

DEPARTMENT OF FISH CULTURE.

W. H. SHEBLEY, In Charge----------Sacramento

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. SCOFIELD, In Charge----------San Francisco

BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, Assistant Executive Officer and In Charge----------Sacramento

BUREAU OF EDUCATION AND RESEARCH.

DR. H. C. BRYANT, In Charge----------Berkeley

BUREAU OF PUBLICITY.

ROLIN G. WATKINS, In Charge----------San Francisco

BUREAU OF GAME FARMS.

AUGUST BADE, In Charge----------Yountville

BUREAU OF SCREENS AND LADDERS.

JOHN SPENCER, In Charge----------San Francisco

BUREAU OF RIVER AND HARBOR POLLUTION.

ROLIN G. WATKINS, In Charge----------San Francisco

—*From painting by Louis Agassiz Fuertes*

RING-NECKED PHEASANT *(Phasianus torquatus)*

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LETTER OF TRANSMITTAL.

San Francisco, June 30, 1926.

Honorable Friend Wm. Richardson,
Governor of California,
Sacramento, California.

Sir: In compliance with law we submit herewith a report of the business transacted by the Fish and Game Commission for the biennial period July 1, 1924, to June 30, 1926.

This report summarizes departmental and bureau reports submitted monthly to this Commission and is prefaced by the report of the executive officer covering in a general way the activities, accomplishments and needs of the Commission.

It is our pleasure to report to you a complete reorganization of this Commission intended to place the Commission upon a business basis. This, we believe, is reflected in the reports of the various departments and bureaus.

As usual, the appendix to the report contains statistical information, much of which has been collected and presented for the first time.

Respectfully submitted.

I. Zellerbach,
M. J. Connell,
Ralph H. Clock,
Board of Fish and Game Commissioners.

In Memoriam

During the biennium the Commission has lost the services, through death, of a former commissioner, George H. Anderson, and three of the oldest deputies and one of the youngest in point of service.

Tom W. Birmingham, who for many years was stationed at Red Bluff, died on August 13, 1924. He began service with the Fish and Game Commission in 1903.

Henry J. Abels died August 21, 1925, after continuous employment with the Commission since 1905.

William J. Moore of Napa died May 4, 1925, his term of service having begun in 1909.

Bernard Luttrell, after only a few months service in Siskiyou County was accidentally killed on October 12, 1925.

The constructive work of these men will live long after them and constitute a greater memorial than we can here express.

REPORT OF EXECUTIVE OFFICER.

Honorable Board of Fish and Game Commissioners
of the State of California,
San Francisco, California.

SIRS: On January 18, 1926, the Fish and Game Commission commenced its reorganization, and it might not be amiss to state the facts leading up to the change.

On May 5, 1925, Commissioner George H. Anderson resigned and Governor Richardson appointed Isadore Zellerbach of San Francisco to fill the vacancy. On December 1, 1925, Frank M. Newbert, for many years president of the Board of Commissioners, severed his connection with the Commission. Mr. Newbert throughout his term of office cheerfully devoted a large portion of his time to the Commission and originated numerous conservation measures. During his incumbency the Commission grew from a small organization to one with many employees and manifold duties.

Judge Ralph H. Clock of Long Beach was appointed by Governor Richardson to take Mr. Newbert's place on the Commission. On December 7, 1925, Mr. Zellerbach was elected president of the board. On December 31, 1925, the then executive officer, George Neale, resigned.

Prior to this time the patrol of the state had been divided into three main subdivisions, one centering out of Sacramento with the executive officer in particular charge, one out of San Francisco and one out of Los Angeles. The wardens in each of these districts were accountable to a chief deputy in the district office functioning under the resident Commissioner. In addition there was a separate patrol, both land and water, under the Department of Commercial Fisheries, responsible directly to the Commercial Fisheries' office in San Francisco. The main patrol activities of the Commission were thus divided into three separate patrol districts. There were two other departments of the Commission—the Department of Commercial Fisheries and the Department of Fish Culture. The operation and supervision of screens in irrigation canals and fish ladders over dams were under the Department of Fish Culture. Pollution problems were handled in tidewaters by the Department of Commercial Fisheries, and in fresh water by the Department of Fish Culture, or by one of the three district offices of the Commission. The water patrol of the Commission in tidewater and on the ocean was under the Department of Commercial Fisheries, and the fresh water patrol in the upper Sacramento and San Joaquin rivers was under the Sacramento district office, without any relation or cooperation between the two patrols and under an arbitrary division of territory. Each of the three district patrol offices of the Commission was a separate entity, self-governed, and responsible solely to the Commissioner resident in that district.

On January 18, 1926, the Board of Commissioners met and appointed the present executive officer upon a program calling for an entire reorganization of the Commission. It was determined that the Commission should function as a business concern, with a similar form of management, centering all responsibility exactly where it belonged; that the

three Commissioners should serve in exactly the same capacity as the directors of any modern corporation, fixing the broad general policies of the Commission, and divorcing themselves entirely from the administrative and executive work which theretofore had been handled by each Commissioner for his own particular district; and that the Commissioners should act collectively as a Commission, and that no individual Commissioner should have the right to determine policies or direct the actual functioning of any department or employee of the Commission.

The executive officer was to have the same status in the Commission as the general manager of a corporation with all functions of the Commission centering in him. In order to do this effectively it was determined that all activities of the Commission, other than those of the three main departments, should be handled by bureaus, each directly responsible to the executive officer.

Inasmuch as the present executive officer had been acting as attorney for the Commercial Fisheries Department, it was deemed best in the interests of economy and efficiency to combine the three offices (executive officer, attorney, and attorney for the Commercial Fisheries Department) in one individual, and that the executive officer should be given an assistant attorney to aid him in his duties. In view of the fact that the new executive officer was to act as general attorney for the Commission and handle the legal work for the Commercial Fisheries Department, it was deemed necessary to remove the executive offices from Sacramento in order that the executive officer might be in close touch with the Commercial Fisheries headquarters in San Francisco. Also, it was decided that the executive offices must be closer to Mr. Zellerbach, the new president of the board, who was taking such an active part in the work. With a new assistant executive officer, Mr. Dunbar, at Sacramento, sufficient contact could be maintained with the Board of Control and the Civil Service Commission. The organization was built up, then, in three main departments:

Patrol Department,
Fish Culture Department,
Commercial Fisheries Department,

and the following bureaus:

Finance and Accounts,
Education and Research,
Publicity,
Pollution,
Screens and Ladders,
Game Farm,
Statistics and Game Problems.

Monthly all the department and bureau heads assemble for a cabinet council meeting at headquarters in San Francisco. At these meetings general matters of policy are discussed and cooperation between the departments planned and consummated. Certain fixed cabinet policies are adopted for our mutual guidance and matters are frequently

referred to the Board with our recommendations. The executive officer is thus guided by the opinion of those entrusted with the detail workings of the various activities of the Commission.

To supplement the cabinet meetings a system of interoffice correspondence has been worked out. All matters of a technical nature coming in the mail or otherwise to the executive officer are immediately referred to the head of the department or bureau particularly interested. Instructions are given with the transmittal that the letter shall either be answered directly by the chief of the department, or that a report be made and forwarded to the executive officer so that he may personally reply. It frequently happens that transmitted matter passes from the executive officer to the Patrol Department, thence to the captain of patrol, from him to the deputy patroling the particular district where the investigation is to be made, and then the report from that deputy comes back through the usual channels to the executive officer. Fixed responsibility is therefore placed and an intelligent answer can be made to the original correspondent.

It was intended to make the Fish and Game Commission function as a big business concern, and we have endeavored in every possible way to avail ourselves of advanced business methods. Modern office furniture and fixtures have been installed. A power multigraph machine eliminates much printing. Roll top desks have been abolished. Supplies are purchased in large quantities instead of piecemeal as heretofore by branch offices and departments. A new card system inventory is being prepared and will be kept up to date. A personnel file is being installed as a basis for increases in salary and promotion.

The general duties and scope of activities of the three major departments of the Commission are as follows:

PATROL DEPARTMENT.

The first step in the reorganization of the Patrol Department was to abolish the local district offices. All of the patrol, land and water, with the exception of one boat working under the Commercial Fisheries Department at San Pedro, was centered under a chief of patrol. J. S. Hunter, who had for many years been in charge of the district office of the Commission at San Francisco, was selected as the new chief. His report appended shows in more detail the organization of his department. It is pleasing to relate that real efficiency in patrol is now being obtained.

Mobility of men is possible, and deputies can be massed in portions of the state when and where needed. Extra men can be put on for the opening of the deer and duck season. When emergency arises details can be shifted from one portion of the state to another. The captain system as instituted in the patrol has been a big success. One feature of the new system which deserves particular comment is the cooperation which this department lends to all other departments or bureaus of the Commission. This year the captains and individual deputies have assisted, when called upon, in the planting of fish; in like manner they have made reports on pollution, and on screen and ladder matters.

FISH CULTURE DEPARTMENT.

The detailed report of this department, which functions as heretofore under W. H. Shebley, the dean of all employees of the Commission, shows its manifold activities and ramifications. Without screens, ladders and pollution, which are now in separate bureaus, this department of itself is still one huge business enterprise. New hatcheries are being constructed; fish ponds are being built; and new theories are constantly being tested.

During the coming year a radical departure will be made in the method of planting fish. Heretofore, prior to the fish planting season, individuals, sportsmen, organizations, boards of supervisors, forest service and others have applied to the Commission for allotments of trout. As far as possible, the Fish Culture Department honored these applications without any possibility of determining whether applicants had proper facilities for transporting and planting the fish. The consequence has been that for years the Commission has been blamed—for the most part unjustly—for poor planting methods. The receiving of fish from the Commission had become a right rather than a privilege, and if the applicant were not given his requested allotment, an uproar ensued. A study of the situation showed clearly that it was as much the duty of the Commission to see that the fish were planted properly as it was to rear healthy fry. There is no question but that our Fish Culture Department is as efficiently managed as any in the country, and that the taking of eggs and raising of fish is being conducted by a man who is a past master in the art, and it has been a crime and a shame that these fish after leaving the skillful hands of our own fish culturists, should be improperly planted, lost or destroyed, through inexperienced or inefficient methods of handling.

To remedy the situation an order has been issued by the executive officer that the Commission will no longer receive any applications for fish. Prior to the next fish planting season the Fish Culture Department will send to each of the patrol captains of the state a communication giving an initial estimate of the number and species of fish which can be alloted to that district for the next season. Thereupon the patrol captain will call into consultation those people in his district who have heretofore received fish from the Commission, his own deputies and such other persons as he deems interested. This conference, armed with maps and all available data, will designate and allot to each stream and lake within that patrol district the proper number and species of fish. These proposed plantings will be designated as either primary or secondary. The report will then be forwarded by the patrol captain to the Department of Fish Culture, together with a designation of places within the district at which the captain desires to receive the fish, and the quantities for each destined point. From their knowledge of the biological or other situations in the streams and lakes, the Fish Culture Department will check these reports over for accuracy as to designated plantings. Thereupon, when the Fish Culture Department knows with certainty the number of fish available for planting during the season, the captain of patrol will be notified whether his allotment will be made in full or cut. If it is cut, the secondary plantings will be diminished. When the planting season begins the Fish Culture Department will

notify the patrol captain of the day of arrival of fish at points of destination and the number shipped. The patrol captain and his deputies in the meanwhile will have arranged with local sportsmen's associations and other interested parties, the question of transportation and volunteers to assist in the planting. The distribution cars upon arrival will be met by the deputies and planting crews, and the planting will be done under the direction of the deputies, with the full responsibility resting upon them. In this way it is hoped that fish will be alloted to streams and lakes rather than to individuals.

It is a radical departure, but from all indications it is a popular change, and we believe that with the support of the sportsmen of the state it can be put over and redound to the credit of our fish planting system.

At the urgent request of the sportsmen of California, this Commission early in the year 1926 commenced the construction and maintenance of so-called retaining or holding ponds for trout. The argument advanced in favor of these ponds was that the planting of very small fry resulted in their destruction by predatory fish, and that if the trout were held until they reached the size of 4½ or 5 inches, they would have a far better chance after liberation. The Commission has constructed holding ponds adjacent to several of its fish hatcheries, and the fish have thrived and will be liberated during the fall and winter months. In addition to these ponds constructed by the Commission, over which it retains the supervision and care, the Commission has cooperated with the sportsmen's organizations of the state in the building of other ponds by furnishing plans and aiding in the choice of sites. These ponds have then been constructed by the sportsmen out of their own funds. They have also arranged for the feeding and care of the fish. In all over two and one-half million trout have been placed in these ponds. The utmost cooperation has been extended to the Commission by the sportsmen, and our Fish Culture Department has, likewise, extended to the sportsmen its help, supervision and advice. The experiment, however, in regard to most of the ponds built by the sportsmen has resulted most unfavorably. It has been fully demonstrated to us that it is the duty of the Fish and Game Commission not only to hatch the fish originally in our hatcheries, but to rear them until they are actually planted. It takes a fishculturist to care for fish in holding ponds just as much as in the trough at the hatchery. The sportsman, no matter how well intentioned, except in rare cases, can not give to the fish in the holding ponds the trained care and attention necessary. Disease is just as prevalent among young trout in holding ponds as it is in hatcheries, and firm, immediate and scientific methods are necessary to combat disease when it appears.

It is the opinion of the executive officer that this Commission should proceed with holding ponds, and should construct them at our hatcheries and at strategic locations throughout the state; but I firmly insist that all of these holding ponds shall be constructed by the Commission and maintained by the Commission out of its own funds, and under the care of our own Fish Culture Department. As many of the ponds as possible should be so-called natural ponds where the young fish can obtain their own food. The question of feeding a large number of fish in

ponds until they reach the size of five inches is at the present time completely beyond the finances of the Commission. We will have to go slowly until further funds are available. It can therefore be stated that the theory of holding ponds is successful when they are maintained under our own auspices. I can not conscientiously recommend that any fish be furnished by us to sportsmen's organizations unless those sportsmen definitely commit themselves to the employment of trained fish-culturists to take care of the fish.

COMMERCIAL FISHERIES DEPARTMENT.

This department continues to function with its usual efficiency under the capable leadership of N. B. Scofield, who has been its head since the inception of the department many years ago. The department retains all of its former functions with the exception of the water patrol of San Francisco Bay and pollution of tidewaters. The detailed report of Mr. Scofield is attached showing his trials and tribulations in the strenuous war with those who sought to ruin the fisheries of this state by the unrestricted use of food fish for fertilizer. In this connection it would not be amiss to point out that the success of Mr. Scofield in his efforts to conserve our fish has been in a large measure due to the unswerving backing of all our Board as it unequivocally took the stand that the fish of this state must be saved.

Mr. Scofield's signal ability and attainments as a scientist have been recently recognized in his appointment by Secretary of Commerce Hoover as a member of the Advisory Board of the U. S. Bureau of Fisheries, and in his appointment by the President of the United States to the position of Commissioner on the International Fisheries Commission between the U. S. and Mexico. This International Commission is working in the utmost harmony with our Commission and has placed in our laboratory at San Pedro a corps of workers who are collaborating with our laboratory assistants in scientific work relating to commercial fisheries.

The various bureaus of the Commission function as follows:

BUREAU OF FINANCE AND ACCOUNTS.

This bureau has charge of the issuance of licenses and of all accounting and funds of the Commission. H. R. Dunbar, as its head, was promoted from cashier to assistant executive officer, so that he could relieve the executive officer of financial details and act as a liaison officer between this Commission and the other state departments at Sacramento, such as the Board of Control. To him is entrusted the workings out of the finances of the Commission under the new accounting method installed for us since reorganization by the Board of Control. At this time I desire to express to the Board of Control my personal appreciation and the appreciation of this Commission for the very valuable work done for us by their accountant Richard Soberanes, who was with us for a period of six months, and the full cooperation extended to us by all members, officers and employees of the Board of Control.

This new bureau has now worked out a simple efficient method of accounting, which allows every department and bureau head to know at any time the exact state of his finances. This heretofore had been

completely impossible owing to cumbersome, antiquated methods. A rigid budget system has been installed and each department and bureau is on a definite yearly allowance, checked by quarterly estimates of needs. I am happy to say that the first six months' experience since reorganization has shown that we were able to keep within our budget allowance.

BUREAU OF EDUCATION AND RESEARCH.

This bureau formerly included in its scope the publicity work of the Commission, but under the reorganization this has been delegated to a separate bureau. The bureau remains under the able leadership of Dr. H. C. Bryant, and now devotes itself entirely to the educational program of the Commission and such research problems as have to do with vertebrate zoology and food of birds and animals. The work of the bureau has been facilitated by extending to it increased financial allowance, so that Dr. Bryant now has a regular assistant who can aid in his lecturing and act as librarian for the Commission. This bureau has already purchased the best of the available motion picture films of California fish and game subjects, and is publishing educational booklets as rapidly as possible. The reorganized Commission lays great stress upon its educational campaign, and as time goes on we expect to increase greatly the scope of this bureau. Our plans contemplate the removal of the bureau's headquarters from Berkeley to the San Francisco office of the Commission in order that its library and other data and material will be available for the use of the officers and needs of the Commission, and so that the executive officer and other branches of the Commission may keep fully in touch with our educational program.

BUREAU OF PUBLICITY.

For many years the Commission has suffered through lack of proper publicity. A large portion of the publicity contributed mainly through unauthorized channels was termed propaganda by the newspapers and promptly turned down. Our first effort, therefore, was to secure a real newspaper man to head this important branch of our work. We were fortunate in securing Major Rolin G. Watkins, who is a specialist along this line, and he has ably conducted this bureau. His detailed report is appended and shows how we are reaching the people of the state. Formal instructions have gone to all departments and employees of the Commission that no publicity must emanate from any of them without going through the executive office to see that it is consonant with the policies of the Commission. We are thus able to centralize responsibility and the policy of the Commission is not jeopardized. Major Watkins' sole instructions in his publicity work were to tell the people of the state what we are doing and what we expect to do in the future and to avoid anything in the nature of propaganda. It has been his principle, therefore, to write stories of activities carrying a human interest value.

To build up the morale of the employees of the Commission, to unify the personnel and to infuse a spirit of pride in being a part of a large organization that is doing things, it is part of the duty of this bureau to get out once each month a "Service Bulletin," which is mailed to every employee of this Commission. Through the Bulletin,

also, all departments issue instructions or give items of particular interest.

BUREAU OF POLLUTION.

Until such time as the Commission had additional funds it was deemed best to consolidate this bureau with the Bureau of Publicity under Major Watkins, and it has functioned ably. As previously noted, it takes over from the Department of Commercial Fisheries and the Department of Fish Culture and the former patrol districts, this ever-present problem which seems to be getting so acute throughout the state and nation. Major Watkins can not be commended too highly for the able manner in which he has conducted the bureau. The most gratifying feature of the work has been the results accomplished by persuasion without court procedure. Sore spots of the worst character have been remedied, and in many cases, obliterated.

BUREAU OF SCREENS AND LADDERS.

At the head of this bureau we have placed a trained hydraulic engineer, John Spencer. The creation of the bureau was deemed necessary because the work of the Department of Fish Culture has grown so enormously within the past few years that it is absolutely impossible for that department to put into this important feature the necessary time and energy. It is almost unbelievable when I say, conservatively, that there should be at least three thousand installations of screens and ladders in California; probably at the present time not more than six hundred have been installed, and of these it is doubtful if more than 50 per cent are functioning adequately.

Early in April a conference was called at the executive office, to which were invited representatives of all power companies and irrigation districts in California, for a free discussion of the screen and ladder problem to the end that committees could be appointed by those interested in such installations to help the Commission devise standard forms, hereafter to be adhered to. The conference was well attended and resulted in the formation of two committies, each of five members, one composed of those interested in power development, and the other of those interested in irrigation matters. These two committees are cooperating with the head of the bureau and we believe they will aid us materially in the solution of our problem.

Large sized maps have been procured for the bureau, old records have been delved into, and the head of the bureau has card indexed the situation thoroughly and is graphically showing upon the maps all installations and their present condition. Surveys are being made as rapidly as possible all over the state, and the cooperation of the patrol, through the individual deputies, is gradually bringing to this bureau the information necessary on which to base an aggressive campaign during the coming spring.

Incidentally, experiments are now being carried forward for the first time, we believe, in the United States, to determine once and for all whether nonmigratory trout, such as rainbow and eastern brook, are carried down the canals and through the turbines of power companies. Racks and traps have been installed below Hat Creek No. 1 plant of the Pacific Gas and Electric Company and in cooperation with the U. S. Bureau of Fisheries, and with the assistance of the associated

sportsmen, our Commission is making an observation extending over an entire year to determine how many fish are carried through the power plant, and the cause of death in each instance. Our biologist makes post-mortem examinations of all fish caught. This information will be of great value.

GAME FARM.

Shortly after Mr. Zellerbach became a member of the Commission it was brought forcibly to his attention that California had lagged behind in the construction and maintenance of game farms. He thereupon made a trip to Oregon and Washington and investigated the operations of game farms in those states. He came back to California imbued with the idea that California must put herself upon a par with

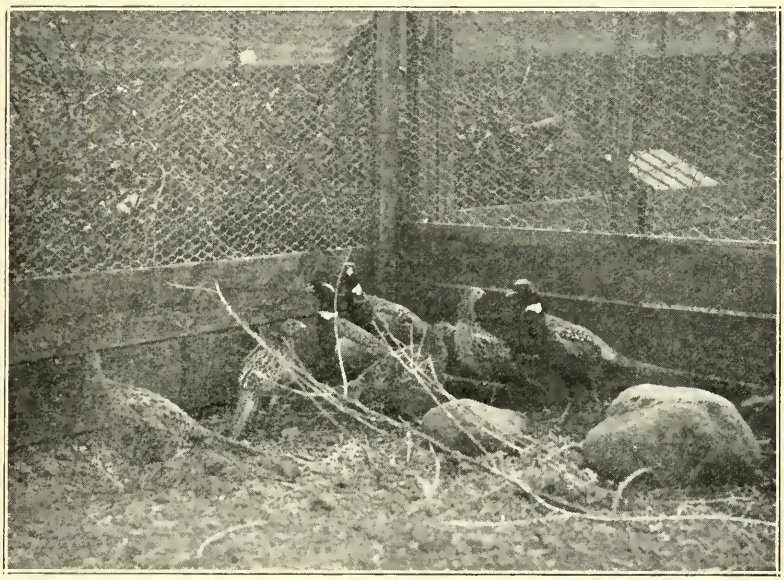


FIG. 1. Pen of five months old ring-necked pheasants reared at the State Game Farm, season of 1926. The hatch for the first season was all that could be expected and favorable reports are being received of the plants made. Photograph by H. C. Bryant.

the other western states, and he succeeded in obtaining from the Governor and the Board of Control an extra appropriation of $50,000 to be devoted to the purpose of establishing a game farm. The only other experiment in game farming which had ever been carried on in California by the Commission was that at Hayward, some ten years ago, which had been abandoned for reasons which I am unable to understand. Through the good offices of the Board of Control, a site was leased from the state near Yountville, in Napa County, on the grounds of the state farm. To oversee the construction of the game farm and take charge of it after completion, the Commission employed August Bade, who had made a great success of similar work in Washington. Through the generosity of our sister states of Wash-

ington and Oregon, certain pens of brood stock were donated to the Commission. Other brood stock was purchased and under the infinite difficulties of raising birds during the construction period, the first real California Game Farm completed its initial year. The report of Superintendent Bade is appended and shows the results attained.

Having learned by bitter experience through our fisheultural operations that it is unwise to have planting done by organizations or individuals who have not had the proper advance training, it was early determined that all planting from the game farm should be done under the strict superintendence of our trained employees. Also, all applications for birds from organizations or individuals were referred to Superintendent Bade with instructions to visit the localities referred to and pass his own unconditional judgment as to suitability. After suitability had been determined, an investigation was then made as to the proper protection for the birds. In no instance has the Commission made a planting unless a large area (in most instances not less than twenty thousand acres) had been set aside by the owners as a refuge. Also, no small plantings were made; the average number of birds to each planting was one hundred and fifty. We are happy to say that our plantings were uniformly successful. The loss of birds was practically nil, and the splendid spirit of the sportsmen and of the justices of the peace have shown poachers that the killing of our planted birds will bring real punishment. We feel that we are warranted in saying that our game farm represents the best that money and intelligence can do in construction work, and that our system of planting can not be bettered. While during the first year we have restricted our planting to pheasants, it is hoped that next year will see our initial planting of quail from brood stock which we have raised this year, and that we will also raise a goodly stock of Hungarian partridges from the twenty pair so kindly loaned us this year by the state of Oregon.

BUREAU OF STATISTICS.

For many years the Commission has been gathering data on fish and game problems which has reposed in our files and desks secure from the light of day. The one exception has been the Department of Commercial Fisheries, where the scientific work of the laboratory has been offered to the public in the form of bulletins and other contributions. To collate and make this information available the Commission has established a bureau in the Patrol Department in charge of R. E. Ludlum, an expert statistician and a student of fish and game matters. It is the function of this bureau to prepare statistical information of the many activities of the Commission, such as fur-bearing animals, trappers, mountain lions, game breeders, and other cognate subjects. In addition, the head of the bureau has charge of the investigation of all bird and animal diseases, and in this work he is fortunate in having available to him the full facilities of the Hooper Foundation of the University of California. At this time I desire to express to President Campbell of the University of California, the Board of Regents, and to Dr. Karl F. Meyer, head of the Hooper Foundation, our cordial appreciation of their cooperation and whole-hearted proffer of facilities for our research work. Dr. Meyer is personally taking charge of

the laboratory end of this work, and I have assigned to the work in his laboratory Robert J. Irvine, our chemist and bacteriologist. Mr. Ludlum will handle the field work, through our deputies, in securing specimens and keeping in touch with the general situation, while the actual laboratory work will be done in the University of California laboratories. Post-mortems will be performed on all birds and animals that die in California when such cases are brought to our attention, and an intensive study is being made of epidemics which may arise at our game farm. We understand that this type of work which we are carrying on is entirely original, and may yield results of great value to the entire country and, perhaps, to other nations.

MONTHLY REPORTS.

Upon assuming office it was immediately apparent to me that there was very little information on hand as to previous activities of the Commission other than the quarterly Fish and Game magazine. The first order, therefore, issued to department and bureau heads was that a monthly written report must be submitted. These are bound in a loose-leaf book, and at any time it is possible to learn in detail of all of the past activities of the Commission. Monthly a full set of these reports, accompanied by a written report of the executive officer, is forwarded to each of the Commissioners. It is my purpose at the close of the fiscal year to have these monthly reports bound into a permanent book, to take their place among the records of the Commission.

COOPERATION.

It is with the utmost pleasure that we are able to state that at the present time this Commission is working in the greatest amity with every bureau and department of both the state and federal governments. For example: The disagreements of many years between us and the Department of Interior relative to a hatchery at Yosemite Valley have been eliminated. A lease satisfactory to both has been executed and the hatchery is under actual construction. Furthermore the park officials are cooperating with the Commission in the enforcement of our fish and game laws, are requiring all hunters and fishermen to have licenses, and will adequately police, and conduct the visitors through the new hatchery when built.

A new cooperative agreement has been drawn up with the Forest Service under which they enforce our fish and game laws, and we render service during periods of forest fires.

The Board of Control has rendered us every assistance in installing a new system of accounting, and aids us in every particular when called upon.

The Civil Service Commission has reclassified our entire patrol so that now all of our wardens are under civil service.

The Division of Water Rights is helping us in our screen and ladder problems by referring to us all applications for the diversion of water.

The Motor Vehicle Department aids us in tracing licenses of automobiles where there have been infractions of the law.

Last, but not least, it is our great pleasure to record that the Commission is now working in the utmost harmony with the sportsmen of

the state. The commissioners and the executive officer have addressed numerous meetings of sportsmen from Siskiyou to San Diego, and everywhere we are assured, by word and deed, of hearty cooperation. New organizations of sportsmen are springing up like mushrooms throughout the state. We are informed that the Associated Sportsmen's Clubs alone represent an organization of 30,000 members. There are numerous branches of other organizations, and in each instance there is now such a spirit of amity between them and the Commission that any criticism received is constructive in its nature.

We might note the cordial relations existing between this Commission and the Fish and Game Study Committee of the California Development Association. This committee was formed as the direct result of the annual meeting of the Associated Sportsmen held in December, 1925, and consists of representative men from all parts of the state who have been devoting their time and energy toward a study of laws and methods necessary to better our fish and game conditions. This committee holds periodic meetings and they have been most generous in requesting the cooperation of the Commission to help them in their deliberations. Their recommendations as made are being referred to this Commission for criticism or suggestions, and we appreciate such cooperation and feel sure that they are doing a work which will redound to the credit of us all.

Again, as in years past, we wish to record our grateful appreciation of the many courtesies extended to us by the railroads of the state in the free transportation of our employees, fish, and game birds. This splendid cooperation on their part has helped in a large way toward the restocking of our lakes, streams and hunting grounds. The savings thus effected have enabled us to increase our plants, both of fish and game, and in this way the transportation companies are doing their share to make more attractive the outdoor life of this state.

DOLLAR-A-YEAR WARDENS.

For the purpose of aiding the regular patrol of the Commission we are now appointing so-called dollar-a-year wardens. To secure such appointment a man must be recommended by a regularly constituted sportsmen's organization. Thereupon his qualifications are gone into by a special agent working out of the executive office. If he is passed upon by that special agent he then, with his fellow members in that district, receives instructions from this special agent upon his duties. The duty of this special agent is to see that the dollar-a-year men cooperate fully with the patrol of the district. The dollar-a-year men select their own captain, and through this captain, the captain of the regular patrol draws on the sportsmen's deputies when needed. The dollar-a-year deputy can not function outside his local patrol district, except to arrest for an offense committed in his presence, unless he receives clearance from his local captain of patrol to the captain of the district of the state which he purposes to visit. Approximately 200 of these dollar-a-year wardens have been appointed and where they have received instructions from the Commission and are operating with the regular deputies, they are performing exceedingly valuable service. It is apparent that the system can be a success if it is

governed by rigid rules in regard to the original selection of the deputies, and if these deputies work with the regular patrol and not independently. A deputy can not be made by giving a man a commission, a written manual of instructions and authorizing him to put a gun on his hip and wander at large over the State of California. This Commission frowns upon technical arrests; and deputies, both regular and volunteer, must be armed with discretion rather than shooting irons. The Commission can get into hot water just as quickly through irregular practices of a volunteer warden as by the acts of its regularly paid wardens. As rigid rules must govern volunteer wardens as govern regular wardens, otherwise our entire system of their selection and authorization will fall into disrepute. I am strongly of the opinion that the dollar-a-year warden service will prove a success, but it must be carefully watched and its rules must be rigorously enforced.

PLENARY POWERS.

It is apparent that this Commission can not properly function unless it has additional powers. These are usually called "plenary powers" but the name is perhaps misleading. As is well known, the constitution of this state gives the legislature the right to divide the state into fish and game districts and to pass legislation appropriate to those districts; consequently there is a period of two years after the meeting of each legislature during which it is impossible to change districts, or seasons, alter bag limits or take any immediate steps necessitated by drought or other exceptional conditions. If the forests, for example, are so dry that it is dangerous for hunters to enter, it is beyond the power of this Commission to declare a closed district. Similarly, if drought conditions dry up streams to a danger point, we can not forbid the public from fishing. Also, if we plant small tributary streams we can not stop fishing until the fish mature. We can not close off portions of lakes, as Oregon does, where they allow no fishing at all so as to constitute a fish refuge, which is just as essential as a game refuge. Abnormal water conditions may dictate that it is necessary to curtail the duck season, or to open it later than the law at present allows. The Fish and Game Commission has no power to make any such rules.

In my opinion legislation should be immediately enacted which will give the Commission power, after proper hearings, to curtail seasons, to diminish the bag limit, to close streams, and generally to safeguard our fish and game. There is a question in my mind whether the legislature has the power or authority to delegate these duties and rights to the Fish and Game Commission.

I therefore suggest that a bill be prepared and presented to the legislature giving us these powers, and that there be presented also to the legislature a constitutional amendment with the same purpose. In the event that the legislature passes the bill requested, a test case can be brought to see whether or not it is constitutional. If the courts declare it unconstitutional, then the matter can be brought before the electors by a constitutional amendment at the next general election in November, 1928.

It is significant that our sister state of Oregon enjoys plenary powers, and those powers have been exercised with such discretion that they are

in favor with all concerned. Many of the middle western and eastern states have similar powers, and California has lagged far behind in these matters.

FUTURE PLANS.

A detailed study of the financial exhibit attached to this report will show that at the present time the Fish and Game Commission is annually spending more money than its actual revenue. This is only possible because we at present have a surplus on which to draw. At the expiration of the biennial period commencing next July, our surplus will be reduced to approximately $200,000. At that time the Commission will have to prune its budget to its revenue or obtain further funds for we can not further dig into our surplus except for permanent improvements or emergencies. If the budget is diminished, many of the new bureaus and activities of the Commission will have to be curtailed. A careful census of public opinion has been made by the Commissioners and the executive officer to determine how the sportsmen feel toward a raise in license fees and, uniformly throughout the state without exception, at meetings and otherwise, we are told that the Commission, now having established itself in the confidence of the public, is entitled to a raise in licenses so that it may continue to function and increase its activities.

A study has been made to determine the effect on the number of licenses issued by a raise in the license fees, and I am of the opinion that the maximum return with the least loss of privileges to hunters and fishermen can be secured through a license fee of $3 for angling, $3 for hunting, a combined license of $5 for both, a $1 angling license fee for children from fifteen to eighteen, and $1 for certain types of salt water fishing. This increased license fee will furnish us with sufficient revenue to provide for our present needs and necessary expansion.

A budget has been prepared showing how this increased revenue would be spent. One hundred and seventy-five thousand dollars is necessary for the salaries and expenses of fifty new deputies. New hatchery operations will entail an annual expenditure of $50,000. (During the coming year there will not be sufficient money in the Fish Culture Department's budget to allow for the operation of all of our new hatcheries.) A new game farm will be built in southern California which will cost us $15,000 annually. The Commercial Fisheries Department must extend its laboratories and other facilities. If our upland birds which we propose to plant from our game farms are to thrive and multiply, it is absolutely necessary that game refuges be installed under a system similar to that of Pennsylvania. This is estimated to cost at least $175,000 per year for the purchase, posting and protection of land.

Eventually this Commission must build up its own crews for the planting of fish. We can not expect sportsmen forever to loan us pack animals and men to carry fish to lakes and streams throughout the state, sometimes as far as the summit of the Sierra Nevada mountains. To establish such a system it is estimated that at least $100,000 will be required annually, and as I have said before, even now there is an

annual deficit of almost $100,000 which must be cared for in the increased license tax.

From one end of the state to the other we are beseiged in late summer and fall with communications telling us of the drying up of streams and the stranding of trout. The Commission has no fish saving crew or outfit. One of our necessities is the installation of a mobile system which can proceed quickly to any such place, seine the fish, put them in cans and transport them to available waters. This will entail the employment of men and the purchase of equipment. We have neither available at the present time. The situation must be taken care of. The plans are worked out and if we can get our increased license tax we can cope with the situation.

As our fine highways from year to year further extend into the high mountains, it becomes increasingly apparent to our anglers that

FIG. 2. Fish from California hatcheries being moved from auto truck to mountain lake by members of the Grass Valley Sportsmen's Club, August 1, 1925.

there are numerous barren lakes and streams, and we in the Commission realize that fact from the constant inquiries made to us calling our attention to lack of fish in many places. We have at the present time one biologist working in the Fish Culture Department attempting to make a survey of all our lakes and streams. Other states have encountered the same problems and we find in reading their reports that they have set up entire departments to handle the situation, with a corps of trained assistants and adequate money.

It is necessary to make a thorough biological survey of all lakes and streams to determine the species that thrive best there, and the plentitude or lack of proper fish food. This is a matter which will take years; but as our nearby lakes and streams are becoming more and more

exhausted, it is apparent that we must concentrate on the other portions of the state where fish can be planted and make the supply somewhat approach the actual demand. It will be an expensive and a long process, but we are face to face with a crisis in our fishing conditions and we might as well face it right now. An adequate survey should be started immediately and we must secure the extra funds. It will cost at least $15,000 annually.

In closing, the executive officer desires personally and on behalf of all his colleagues, to express to Governor Richardson and to you, Mr. Zellerbach, the president of the Commission, and to Mr. Connell and to Judge Clock, its members, and to all other employees of the Fish and Game Commission, our appreciation of your whole-hearted support and cooperation. What little success we may have attained in reorganizing the Commission has been due to the cooperation of the Governor and to the untiring work and energy both of the Commissioners and of every single member of the various departments and bureaus of the Commission. I have made it my task to travel over the state from north to south and from east to west to meet our deputies and others on the ground, to look into the various activities of the Commission and to get a first-hand comprehensive view of the situation. I am impressed by the splendid personnel which has been built up over a long period of years. I wonder at the self-sacrificing attitude of our deputies and other employees. It is incomprehensible that these men have stayed with the Commission from year to year on a salary less than that which is paid to the ordinary policeman upon his beat in the cities of San Francisco and Los Angeles. Our deputies are a fine, up-standing bunch of men, two-fisted fighters all, and men who have earned the respect and confidence of the districts in which they reside. We are all a happy family, working toward a common end, the conservation of our fish and game.

Respectfully submitted.

B. D. Marx Greene,
Executive Officer

FIG. 3. Photograph of buck killed by mountain lion near Avery, Calaveras County. Lion hunter Bruce secured the culprit, a male mountain lion, a quarter of a mile from the kill. Photograph by Jay C. Bruce.

DEPARTMENTAL AND BUREAU REPORTS

REPORT OF THE DEPARTMENT OF PATROL.

By J. S. Hunter, Chief of Patrol.

With the reorganization of the Commission at the beginning of the year 1926, a Department of Patrol was created. The entire patrol force with the exception of the salt water patrol, in southern California, was placed under one head, the chief of patrol. Previous to this, the state had been divided into three districts—San Francisco, Los Angeles and Sacramento. The deputies in these districts were responsible to their superiors in the respective offices. In many instances it was found that the best results could not be secured through this system. There was a lack of cooperation between the districts and lack of uniformity in the enforcement of many laws. The change was made in order that better and closer cooperation might be obtained and the laws enforced uniformly throughout the entire state. Under the old system it was impossible to keep close track of the work of the individual deputies. In order that every man might be under closer supervision, the state has been divided into patrol districts, with a captain of patrol in charge of the men in his district. The captains have been selected with great care and only men with years of experience and excellent judgment have been appointed. These captains work under the direction of the chief of patrol and in every way are held responsible for conditions in their district. It has been found that the men appointed captains are perfectly willing to assume the added responsibility and there is a greater incentive for the patrol deputies to do their work effectively for they realize that in time they may be promoted.

The boundaries of the patrol districts are at present more or less arbitrary and will be changed as experience shows necessary. In order to distinguish the patrol districts from the numbered fish and game districts, the former have been designated: northern California, Lassen, Sacramento Valley, Sacramento, San Francisco, northern San Joaquin, southern San Joaquin, southern California, Monterey, Sonoma and Humboldt. The very important district of San Francisco includes the bay and river patrol that was formerly carried on under the direction of the Department of Commercial Fisheries. It is believed that better enforcement of the laws will be had through the cooperation of the land and water patrol.

In order that the chief might be relieved of a great deal of the routine office work so that he could spend more time in the field, Deputy S. R. Briggs, who had been doing patrol work in the San Joaquin

Valley, was promoted to assistant chief and transferred to the San Francisco office. Mr. Briggs' field experience and education makes him well qualified for his more responsible duties.

Just before the close of the biennial period, a civil service examination was held to establish an eligible list from which deputies of the Commission could be selected. It was found that approximately one-half of the deputies employed were without civil service standing. Practically all of the men employed by the Commission passed the examination and were given the protection of civil service regulations.

In March, 1926, a convention of the deputies of the Commission was held in San Francisco. The men of the entire staff were brought together and were instructed by members of the Commission in their duties and informed regarding branches of our work of which they had little knowledge. It is hoped that we will be able to hold other conventions in the future, as much good results from such gatherings.

During the biennium deputies made a total of 1432 arrests for violations of the game laws and 1675 arrests for violations of the laws relating to fish. A total of $104,455 was assessed in fines together with 5093 days imprisonment. These figures show an average of over four arrests per day and an average income from fines for the fish and game protective fund of more than $143 for every day of the two-year period. These figures should show that wardens are on the alert for violations and that a determined effort is being made to adequately enforce the fish and game laws.

The study of the diseases and the causes of the reduction in abundance of our various species of wild life has been more or less neglected by the Commission in the past. A bureau has now been planned within the Department of Patrol, that will make a study of diseases and conditions affecting game animals and birds. We know that epidemics often cause a serious loss of life from time to time in domestic animals and that the study of these diseases has resulted in the saving of thousands of dollars. If the same methods, modified as necessity requires, can be adopted in controlling the diseases of wild animals, we shall accomplish much in wild life conservation. Hence, it will be the duty of the new bureau to make a study of everything that affects game in the field. In the past, deer have been subject to serious epidemics that have caused the death of thousands of animals. The duck disease that appears more or less regularly every year, kills possibly hundreds of thousands of birds. We know that there are diseases that affect our quail and greatly reduce their numbers. If these natural losses can be eliminated, there will be more game left for the sportsmen to harvest and more game to propagate in the field. This work offers great possibilities and should be carried on by the Fish and Game Commission of every state in the union.

The patrol department is cooperating fully with every other department of the Fish and Game Commission, particularly so with the Department of Fish Culture. Previous to the sending of fish to the various patrol districts, the captain of that district is notified, and when possible an experienced deputy receives the fish and accompanies them to the streams in which they are to be planted. The deputies have made a survey of the state and have reported the condition of the screens and ladders on the various streams. Similar cooperation has

been carried on with the Bureau of Pollution. Minor cases of pollution are attended to by the captains or deputies themselves, but in serious cases of pollution by manufacturing plants, the head of the Bureau of Pollution is advised and outlines his own policy.

In many sections of the state, due to the lack of rain, there has been serious loss of trout on account of streams going dry. Whenever it has been possible the patrol force has rescued such stranded fish and planted them in living waters. This is a very important part of the work of the patrol department and will be carried on more energetically in seasons to come.

The Fish and Game Commission is an educational commission as well as a law enforcement body. We believe that more good will result through educating the sportsmen of the state and showing them that it is to their interest to respect the various conservation laws, than through the courts of the state. We are seriously opposed to technical cases. A technical case will do much more harm than good and in practically all instances makes an enemy of conservation rather than a friend. Serious violations must be prosecuted vigorously and it is only through the active support of the various justices of the peace of the state that this work can be carried on successfully. The game laws are more flexible in the penalties provided than almost any class of misdemeanors. The minimum fine for game cases is $25 and the maximum, $500. It rests with the court as to whether the maximum or mimimum fine is imposed. Flagrant and repeated violators should receive the maximum rather than the minimum fine.

At this time the patrol department wishes to thank the justices of the peace throughout the state for the most excellent cooperation that they have given. We need the help of every justice of the peace in our work.

California sportsmen have been more kindly considered by nature than have the outdoor men of any other part of the United States. While there are many thousands of square miles of fertile valleys where every branch of agriculture may be carried on, there are many more thousands of square miles of wild country that is not agriculture land, and which will be held in practically its primeval condition for years to come. Under wise conservation laws, strictly enforced, wild life will continue indefinitely.

Under sane management there is no need for any controversy between the agriculture and the sporting interests. Fields can be cultivated along side of wild land teeming with game; streams can be utilized for irrigation and power without detriment to the fishing interests, provided each problem is met with an open mind and a sincere desire to solve it in a manner that will work for the best interests of all the people.

The past two years have marked a distinct advance in conservation in our state. In general it can be said without fear of dispute that conditions are better than they were at the beginning of this biennial period. The most striking increase in game has been with valley and mountain quail. This is true in practically every part of the state. It is due, without doubt, to the change that was made in the law at the last session of the legislature when the season was limited to the month of December. The season comes at a time when it is difficult for many hunters to get into the field, when the birds are fully developed, after

the rains have commenced and when the birds are no longer staying in the vicinity of the watering places. The law has shown that quail will respond very quickly to protective measures. Fortunately quail are rather prolific breeders. It is not uncommon for them to have two broods, and a second clutch will be laid in practically every instance if the first clutch is destroyed.

Due to the lack of rainfall throughout California, and in fact, throughout the entire Pacific coast, there has been a scarcity of ducks during the past two years. Last winter was particularly mild and great numbers of ducks are reported to have remained in the north. With the return of normal winters, duck hunting will improve and those who find their pleasure in the duck marshes will have no cause for complaint. Reports from other sections of the United States indicate that ducks have increased greatly since the federal law went into effect in 1913 and since uniform legislation has been provided for the entire country. The most urgently needed protective measure for waterfowl is a treaty with Mexico, similar to the understanding existing between our government and Canada as a result of the treaty made with Great Britain, with the proper means of enforcing the provisions of the treaty on both sides of the line. At the present time ducks are practically without protection as soon as they cross the southern line of the United States.

The epidemic of foot and mouth disease that broke out in 1924 was carried to the deer in Tuolumne County by cattle that were allowed to go through the quarantine lines into the mountain areas. Feed was so scarce in the valleys that it was deemed wise by the authorities to allow grazing in the mountains. Unfortunately, very shortly after the first lot of cattle went through the lines, the disease broke out. After very strenuous measures were taken by the federal authorities in charge of the control work, the disease was overcome but not until thousands of deer had been killed. The situation was so improved in the spring of 1926 that it was considered safe by the authorities to allow cattle from the valleys to again enter the restricted areas. It is certainly to be hoped that there will not be another outbreak of foot and mouth disease as it will not only endanger the deer of the state, but the entire live stock industry.

That deer will increase rapidly under favorable conditions is proved by the experience of R. O. Rampont of Ukiah. Mr. Rampont in the spring of 1921 secured a black-tailed doe fawn. In the fall of the same year, a buck was obtained and in the spring of 1922 another doe fawn. These animals were kept on his property in Ukiah in an enclosure covering somewhat less than half a city block. By the fall of 1925 from the start of two does and one buck, Mr. Rampont had a herd of sixteen deer. One of the does at the age of 15 months gave birth to a buck that was husky enough to grow forked horns instead of spikes the first year. This is more remakable when it is considered that the doe was only eight months old when mated.

California is to be congratulated on the results of its deer conservation. For over twenty years we have killed deer under a liberal season and limit. Many thousands of deer have been harvested each year. Notwithstanding this heavy toll, in most sections of the state, deer are as abundant as they were twenty-five years ago; in fact, the residents in many sections claim that they are even more abundant. The deer

law is as nearly ideal as it is possible to have a game law. When you can separate a distinct class of animals which hunters are allowed to kill and which, in practically all instances, can be easily distinguished from the protected class, you have a law that will insure the maximum protection and utilization. The protection of does, fawns and spike-bucks insures a constant supply. Forked horns and larger deer can be easily distinguished. As long as this law remains and is enforced, our supply of deer is going to continue. The danger lies in the killing of the protected class by careless hunters who shoot without knowing at what they are shooting. If a doe or spike buck is killed, they leave it to rot in the brush. Such violators are extremely difficult to apprehend and can only be controlled by a considerable force of deputies throughout the entire deer section.

Spotlight hunting has increased and is the greatest menace to the deer at this time. Such hunters will kill does, fawns and spikes. They work on the principle that they are violating the law anyway and another violation will not add greatly to the offense. It is extremely difficult to devise a law that can be enforced that will put a stop to this illegal work, but it is believed that if a statute is adopted prohibiting the carrying of uncased rifles and shotguns in automobiles at night in sections frequented by deer, that much of the night killing will be eliminated.

Deer hunting with dogs has been severely criticized by many conservationists. There are many excellent arguments that can be made for and against the use of dogs in hunting. In most of the eastern states, dogs are prohibited. If it is deemed wise to further restrict the use of dogs, it might be well to consider a law that would provide that only small dogs be used. Such dogs would not be swift enough to catch, or large enough to kill a deer, but would be entirely satisfactory for "jump dogs" and for trailing wounded animals that would otherwise be lost.

The work of the Commission in the control of mountain lions has brought out many interesting facts regarding the distribution of lions in our state. A bounty on lions has been paid for nineteen years. During that time, 4680 lions have been killed. For the past eight years records have been kept of the number of each sex killed. These records show that 51 per cent of the lions killed have been males, and 49 per cent females.

There is every reason to believe that we are slowly but surely getting the best of mountain lions in California and that the number of animals killed is slightly better than the normal increase; but assuming that it is only the increase and knowing that the normal litter is only two kittens and that the female lions whelp every two years, then assuming that 255, the average kill for the biennial period, represents 49 per cent of the lion population of the state, we estimate that the total number of lions in California is approximately 520. These figures are 10 per cent less than a similar estimate made five years ago. A study of the accompanying cut will show where lions have been most abundant during the last nineteen years. The greatest number of lions, 2630, have been killed in the northwestern portion of the state, and of that number nearly 1100 have been killed in the humid coast counties of Mendocino, Humboldt and Del Norte. It would seem from this that the lion is not like other cats—afraid of water. It is also interesting

to note that this section of the state is also the location of the greatest deer population. In the six southern counties only 254 lions have been killed, while in the counties east of the Sierras, Modoc, Lassen, Mono and Inyo, only 47 lions have been killed. Contrary to the general belief, lions are not abundant in any part of the state. Each animal

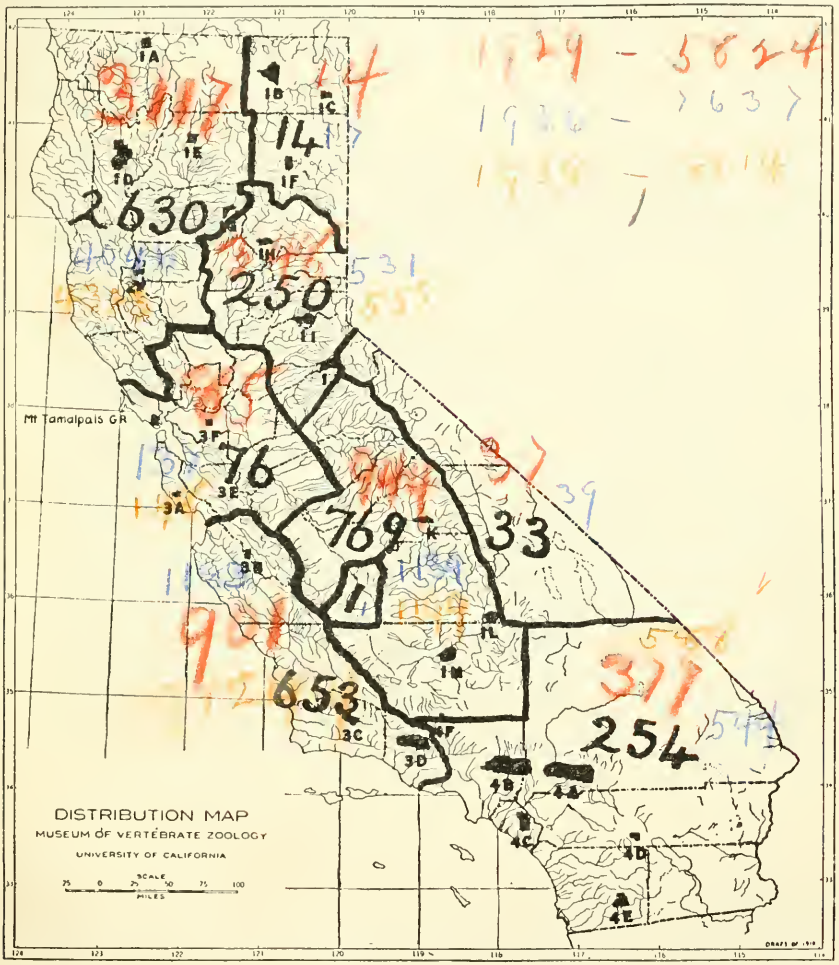


FIG. 4. Map showing the number of mountain lions killed in various districts of California. The north coast region furnished more than three times the number of lions taken in any other district.

must have a considerable range. The toll of deer taken by the lions in the state runs into the thousands. With the elimination of mountain lions, there will be many more deer for the hunters to harvest.

The most encouraging evidence of the interest being taken in conservation by the general public is the organization of fish and game clubs in every part of the state. There have been many live clubs in various sections of the state in the past, but recently there has been a renewed interest and clubs have been formed in practically every

county and the membership at present numbers many thousands. The Fish and Game Commission has carried on practically a lone fight for many years. There has been considerable help given by individuals, and by the few clubs that were in existence, but with the active support of the new organizations and the sincere desire on their part to bring about better game and fish conditions, much more effective work can be carried on. Already the clubs formed have sponsored the appointment of a considerable force of voluntary wardens who have been appointed as dollar-a-year men. These men will render valuable assistance to the regular deputies in their field work and will also be a great help in carrying out the educational work of the Commission to those who as yet do not realize that unless our conservation laws are enforced, the wild life of the state is doomed. It is only with the active support of every real sportsman that the Fish and Game Commission can do its best work.

REPORT OF THE DEPARTMENT OF FISH CULTURE.

By W. H. Shebley, In Charge.

In conformity with the regulations of the Fish and Game Commission, herewith is submitted the report of the Department of Fish Culture for the biennium ending June 30, 1926.

During the two seasons covered by this report, the department has hatched and distributed 59,524,700 trout and 14,157,150 salmon. The

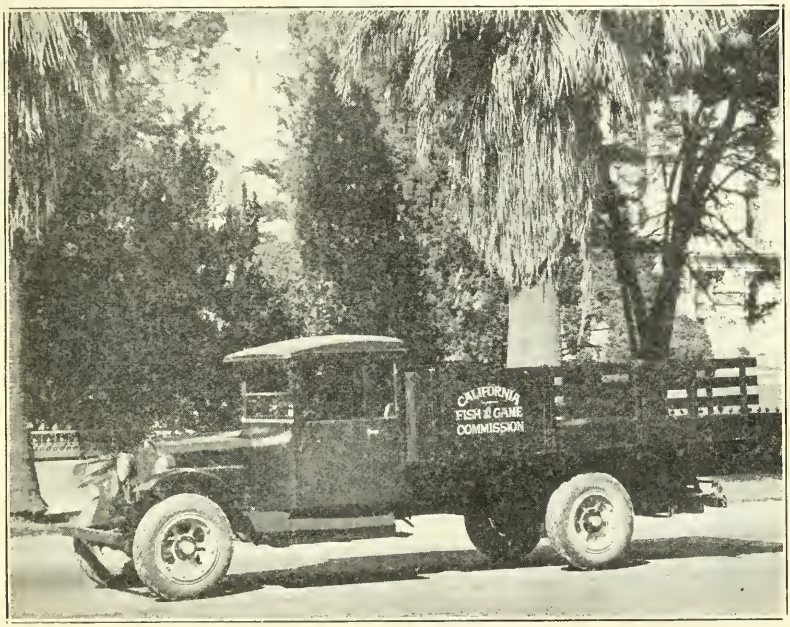


Fig. 5. Speedier transportation and better local service in fish distribution is being accomplished by the use of auto trucks, one of which is here shown.

salmon eggs were all collected from the salmon egg-collection station at Klamathon on the Klamath River.

During the biennial period we have operated sixteen hatcheries and twenty-one egg-collecting stations. Two fish distributing cars have been used to transport the fish from Mount Shasta and Mount Whitney hatcheries to the different sections of the state that are not supplied from the local hatcheries. The ever-increasing demand for fish to supply the depleted streams of California caused by the open season being entirely too long and the excessive fishing of the thousands of anglers who are fishing the streams from the opening day of the season until the season closes, has caused our hatcheries and egg-collecting stations to be operated to their fullest capacity, and yet has not produced one-half enough fish to fill the demand made on the trout waters of the state.

Before the advent of automobiles and good roads and trails, the majority of persons were satisfied with one or two trips to their favorite

fishing waters. Now there are thousands who make week-end trips to places where they think they may catch a limit of fish, regardless of size. Many streams no longer contain spawners and the majority of the fish are caught out before they reach maturity or the breeding age, and the only fish found in such streams are the products of the hatcheries.

The use of salmon eggs and the eggs of other species of fishes should be prohibited as the use of fish eggs as a bait is the easiest way to catch fish. It is unsportsmanlike, as all species of trout will devour eggs of other species as well as the eggs of their own kind in preference to any other food, thus causing them to fall an easy prey to persons using eggs for bait. Nor is the use of eggs confined to the hook, but are also used to entice the fish to gather in large schools so that they can be taken with but little effort. In some places, persons, in their greed to take the fish in an unfair way, start in by using salmon or trout eggs to cause the trout to collect in large numbers. Then they take flavored canned products of the garden that are intended for human consumption and feed the trout at places where they usually gather to feed. The fish, not finding salmon eggs in quantities great enough to satisfy them, soon learn to feed on vegetable foods and are easily taken in great numbers to the detriment of those who are not so greedy but are willing to use a more sportsmanlike method in catching their fish. Such practice should be prohibited by law, particularly the use of fish eggs for bait or the use of eggs to attract the fish to congregate where they can be so easily taken.

The large output of hatcheries did not more than meet one-half the demand for fish to supply the streams and lakes and stock the thousands of barren lakes in the high Sierra. Each season new trails are being constructed and new areas opened for the pleasure of the thousands who are seeking outdoor recreation. Therefore there is increasing need of stocking all barren waters with fish and with aquatic plants and insects to improve the food supply if fish are to be furnished for those who are desirous of angling as a pleasure, and for those who desire a certain amount of food of a kind that can not be obtained anywhere else.

To meet these necessary demands on the Commission, more hatcheries must be established and lakes and streams reserved to furnish eggs for the hatcheries. But more important than these valuable sources of supply, pond systems for the rearing of brood stock must be established in several suitable locations in order to supply increased millions of eggs annually for our hatcheries. These pond systems should be built on the same general plan as that at Mount Shasta Hatchery, where nearly one-third of the fish eggs in California are produced. Ponds for the raising of the spiney-rayed game fishes also should be constructed, so that several millions of young black bass and the different species of spiney-rayed fishes can be raised annually and distributed in suitable waters as trout are distributed.

These recommendations have been made before by this department, but due to a lack of funds, these essential plans for the propagation and perpetuation of our game fishes have not been carried out.

During the summer of 1924 an intensive campaign was carried on, known as Initiative Measure Number Eleven, to prevent the erection

of dams in the Klamath River or other obstructions that would interfere with the free passageway of the migratory fishes that ascend the river on their way to the spawning grounds and to the egg-collecting stations on the upper reaches of the Klamath River and tributaries. The pollution of the streams tributary to the Sacramento and San Joaquin rivers by mining debris in the pioneer days and later, destroyed the spawning beds of the salmon and steelhead trout and thus broke up their runs in many of the streams. Then followed the erection of high dams by hydro-electric power companies and the dams used for

FIG. 6. Some Mackinaw trout from Lake Tahoe secured at a depth of 350 feet. During the past seasons large catches of Mackinaw trout have been made in this lake. Although originally planted in May, 1895, and taken occasionally since that time, these fish are being caught in increasing numbers in recent years.

diversion and storage of water for irrigation. All this had a damaging effect on the migratory trout and salmon until approximately 90 per cent of the spawning areas in these two river systems have been cut off from the salmon or destroyed.

From reliable data that we had obtained we were satisfied that it was for the best interests of the general public that the Klamath River should be set aside as a fish refuge from which a large number of salmon and trout eggs could be collected each season to furnish a supply of eggs to maintain the run of salmon in the Klamath River as well as to furnish trout eggs and salmon eggs for many of the rivers, lakes and streams in the state. This could be done without injury to the industrial development of the state. The promoters of the projects of constructing high dams for power development were actuated by a desire to promote these plans without consideration of the great loss to the state of the wonderful run of anadromous fishes in the Klamath

River. Salmon can not pass through any fishway over extremely high dams, some 250 feet in height, in numbers sufficient to maintain the run. In fact the only means of passing the fish would be a mechanical contrivance which would be impracticable and in a few years, the run would be exterminated. If a run of spawning fish were passed over the dams there remains the danger that the fry resulting from the eggs deposited in natural spawning beds or reared at the hatcheries could not be screened out of the intakes to the impulse wheels of the large power plants. The use of electric fish stops was advocated for this purpose.

We had carried on experiments with electric fish stops and had found that various models were failures, as the tingling sensation caused by the low voltage only caused the fish to accelerate their speed and pass more rapidly down the canals where the experiments were tried. Where a high voltage was used, it killed the fish. These experiments were carried out by practical tests where control of the entire experiments was under the supervision of men interested in perfecting screens to save fish from destruction in large canals as well as by the persons who held interests in the patent.

Protests were made to the Division of Water Rights and the Federal Power Commission against the granting of the rights to construct these dams, but our efforts were unsuccessful. As a last resort the Fish and Game Commission appealed to the people to support an initiative measure instituted by the Commission and sportsmen and by all those interested in saving the Klamath River run of salmon from extermination. The result was that the measure was carried by a majority of nearly 200,000 votes, thus saving the Klamath River as a fish reserve to the people. The eggs from the great run of trout and salmon may now be used to stock the Sacramento River and tributaries, Monterey Bay region and ocean areas off the shore from Fort Bragg as well as to furnish millions of trout eggs to supply other streams and lakes in this state with the wonderful trout from the Klamath region. This measure has secured for the people, a valuable asset to our natural resorces without any damage to the industrial development of the state, as there is hydro-electric power enough developed or in the process of being developed, to furnish electric power for all the needs of the state for many years to come. Other streams remain not so valuable to the fish life and these should be utilized before destroying natural resources difficult to replace.

TROUT AND SALMON DISTRIBUTION.

The following species of trout have been distributed from the hatcheries during the biennial period covered by this report.

Rainbow	26,771,373	Large Lake	2,540,820
Loch Leven	11,236,504	Cut-throat	400,000
Steelhead	5,926,900	Black-spotted	1,322,200
Eastern Brook	6,799,808	Golden	838,000
Mackinaw	75,000	Salmon	14,157,150
German Brown	3,614,000		

The excessive fishing, both in our river systems and ocean areas, has greatly reduced the number of valuable food fish that formerly entered our rivers in teeming hordes. The unusually dry fall seasons that have

prevailed for a number of years past, have also prevented salmon on the upper reaches of the Sacramento River from reaching the government hatcheries on Battle and Mill creeks in their usual numbers. The obstruction caused by the dam of the Anderson-Cottonwood Irrigation District has caused the greatest destruction to the Sacramento River salmon run, as it not only prevents the salmon from reaching the spawning grounds on the Pit River and tributaries during the summer and fall, but prevents the run from passing into the McCloud River, where the United States Bureau of Fisheries could collect eggs for propagation. A small number ascends the river in the early spring before the splash boards are placed on the dam and these reach the McCloud River where a small number of eggs are collected in comparison with the number collected and hatched years ago at Baird, the oldest Chinook salmon station in the world, which has been operated by the United States Fish Commission since 1872.

Surveys have been made for an up-stream type of fishway that would easily allow the salmon that reached this dam free passageway up the river, but the directors of the irrigation district persistently refused to construct a fishway, maintaining from the start that a fishway was not necessary. This has been a matter of controversy between the Fish and Game Commission and the irrigation district directors. The Commission asked for an injunction to restrain the irrigation district from using the dam to obstruct the run of salmon in January, 1921, before Judge McDaniels who was presiding over the Shasta County superior court bench in place of the local judge who was incapacitated through illness. But owing to a conflict of testimony a court decision was not obtained. The court upheld the fishway law, but decided to make a personal investigation during the next run of salmon before giving a final decision. In the meantime, an election had been held and another judge elected to take the place of the judge who was deceased.

During 1922, the Commission commenced another action to restrain the district from using the dam until an adequate fishway was built, but a compromise was agreed upon between the Fish and Game Commission and the directors of the irrigation district, whereby a series of experiments of different type fishways were to be carried on to determine whether a passageway for the salmon could be made by removing certain sections of the splash boards, or if this failed, to construct a box-like structure to form a pool so that the salmon could pass the dam.

To this date, June 30, 1926, nothing has come of these experiments. Plans are under way to bring this matter to a final decision and we expect to have the matter settled before the salmon ascend the river this fall. In the meantime, the valuable salmon run is being reduced each season, because an adequate fishway has not been built.

The majority of the salmon eggs collected from the Klamath River have been hatched at Mount Shasta Hatchery and the resulting fingerling salmon and fry distributed in the upper reaches of the Sacramento River. But if we are to keep enough salmon in the Sacramento River and Monterey Bay region to furnish the markets with a fair supply of these fish, we must use every effort to allow all the salmon possible to ascend the Klamath River. To attain this end anything that will tend to reduce the number of spawning salmon from ascending to the upper reaches of the river must be prohibited. The use of spears, not only in

the Klamath River but throughout the whole state, for the taking of any species of fishes should be stopped. Spearing fish is unsportsmanlike and in most cases is a wanton waste, as many fishes are taken, particularly salmon, that after examination, are found to be spawners and unfit for food and are thrown away and other fish caught that are fresh run and do not show evidence of having been taken from the spawning beds.

The number of salmon eggs collected from the traps at Klamathon during the last two seasons was 15,670,000, considerably less than half of the annual take of 1923.

We refer again to the recommendations made in our reports concerning the Chinook salmon in 1922-1924. "The Fish and Game Commission is waging an unhill fight when it comes to conservation, as the people do not realize the destruction of wild life until it is too late." Recommendations for the better protection of the salmon on their migrations to the spawning grounds, the prevention of the use of spears and practical and scientific methods of operating our hatcheries must be given the attention of everyone who desires to see this valuable fish preserved from extermination.

MOUNT SHASTA HATCHERY.

The efficient work and general operations of the Mount Shasta Hatchery and its auxiliary stations has continued through the present biennial period. The total number of trout hatched and distributed from this hatchery during the last two years ending June 30, 1926, was 34,818,516. The total number of salmon hatched and distributed was 6,103,000. The total number of trout eggs collected from the ponds at this hatchery during the two seasons covered by this report was 22,683,000. This number with the additional number of trout eggs shipped from outside stations makes a grand total of 38,226,000 trout eggs.

During the summer of 1925, the Commission had a deficiency appropriation made for the improvement and repairs of Mount Shasta Hatchery which had become greatly in need of repairs. The buildings were getting old and dilapidated, the pond walls needed relining, flumes were rotted and in a bad state. It was recommended that improvements should include: replacement by iron pipes; wooden tanks replaced by concrete; holding ponds relined; a new sewer system installed; the old hydro-electric plant replaced by a modern one; installation of a refrigerating plant for the manufacture of ice and for keeping the temperature at the proper degree in the cooling room where the fish food is kept; new foundations under hatcheries A and B; rustic placed on hatcheries C and D; ceiling of the walls and overhead of hatcheries C and E; installation of new hatching troughs in Hatchery E, construction of new iron fence around the grounds and a concrete walk from the hatchery grounds to the county road. Hatchery D was in such bad condition that it was decided to tear it down and construct a new and larger building on another site. These plans were all approved by the Board of Fish and Game Commissioners and after the estimates were made up, the Governor set aside $52,068.37 for these improvements, which at this date, June 30th, are being made. The Department of Public Works handled the funds as provided by

law, but the work was carried on under the supervision of the Department of Fish Culture of the Fish and Game Commission. When the repairs and improvements are completed, Mount Shasta Hatchery will be one of the largest if not the largest trout hatchery in the country, and will have a sufficient capacity to care for all the salmon eggs and resulting fry that can be shipped from the Klamathon station.

During the fall of 1924, a new spawning house was built to take the place of the old building used for this purpose. The old building was in a bad state of decay and a new one was necessary. The new building is well lighted and convenient in all its arrangements, being a duplicate of the old spawning house that had been in use for twenty years. Owing to the number of persons camping and throwing rubbish, and other contaminating matter into the waters of Spring Creek before reaching the hatchery diversion, it was deemed necessary to drive an artesian well near the pumping plant that furnishes the domestic supply to the hatchery cottages and superintendent's residence. At a depth of 42 feet a flow of pure water was struck that flowed continuously 19 inches above the 2½-inch pipe that lined the well. This supply is forced into a tank and used as a domestic supply for all the buildings on the hatchery grounds.

During 1924 a new shipping can storage house was constructed 24 feet by 42 feet. It is made of corrugated iron roof and sides. A steam boiler was installed so that all the cans used at the hatchery can be sterilized by steam under pressure, thus keeping them sanitary and free from bacteria. Consequently when they leave the hatchery loaded with fish, there can be no chance of fish being affected from foul cans or of contracting disease that may cause the death of fish after planting.

It being necessary to have more room in the hatcheries at the time the salmon fry are swimming up and before they are ready to be deposited in the rearing ponds, three new ponds were built for this purpose during the fall of 1925. They are 40 feet long, 9 feet wide and 30 inches deep.

The same fall a new roof was placed on the barn, and roads on the hatchery grounds as well as the road leading to the hatchery grounds from the country road, were graveled.

The stock of brood fish in the ponds have all been in good condition during the last two years, except the eastern brook trout. Approximately 40 per cent of the eastern brook, on coming to maturity, could not be spawned as the eggs in the ovaries only partially developed. The eggs were found to be dead when the fish were opened for dissection though the females remained fat and healthy. The eggs became caked and would not slough or pass from the ovaries, but gradually shrivelled up, forming a mass of closely connected eggs that were not supplied the proper circulation to allow them to ripen. This condition has never happened before in the history of fishcultural operations in this state and we fail to find any mention of a similar condition in any of the pathological reports pertaining to the diseases of fishes. No trouble was experienced until we began to raise brood stock from commercial hatchery eggs that were purchased outside the state. We are of the opinion that this condition may be due to the fact that the majority of the eggs from commercial hatcheries are taken from very young fish and the continual breeding of these immature fish has lowered the vitality of the stock so that this condition is brought

about. This condition should have a close scientific investigation, which we hope to make in the near future. In former years we had mature fish from two to six years and even older and always had perfect eggs that produced strong, healthy eggs and fish. We do not state positively that the continual breeding of young fish will produce the results mentioned above, but as soon as possible, we shall raise our own stock fish as in former years.

The predatory birds and animals have taken quite a number of brood fish during the last two years. Three otters were trapped on the hatchery grounds during the summer of 1925. A constant watch must be kept by the hatchery crew to guard against the predatory animals and birds that are constantly attracted to the ponds by the large number of fish contained in them and by the ease with which they can be caught.

FALL CREEK HATCHERY AND POND SYSTEM.

The Fall Creek Hatchery has been operated to its capacity during the period covered by this report. Improvements were made by constructing a new concrete settling tank from which a 12-inch iron pipe conveys the water to the hatchery and by installing 116 new hatching troughs. They are of a new standard size. The hatching troughs are now arranged so that each trough receives an independent supply of water. This arrangement is especially desirable at this hatchery owing to the large amount of mud and sediment carried in the water during certain periods of the year.

The number of trout hatched and distributed from this station during the biennium was 888,000. The number of salmon hatched and reared in the ponds before being distributed in the Klamath River during this period was 7,556,000. (The resulting fry taken during the fall of 1925 have not all been distributed at this date, so will not be reported on until our next biennial report.)

HORNBROOK EGG-COLLECTING STATION.

We are planning to move this station farther down the creek for several reasons:

First, the distance from the Klamath River to the trap is approximately two miles and a great many of the trout find spawning beds below the rack and do not enter the trap. As a consequence, a less number of eggs are taken than would be the case if the trap was located farther down the stream. This condition was known when we located at the present site, but we did not have money enough to construct a permanent station at that time as the formation of the creek bottom necessitated a considerable outlay of money to construct racks that would stand the floods during the spring months. With the money now available by the deficiency appropriation we can move the racks and traps and if we are fortunate in getting some assistance from some one owning teams in that section, we can move the cottage for the help, tanks, etc., on skids, to the new location.

Second, the great number of fish that find spawning beds below the rack are a great temptation to the law violators who spear many of the spawners each season. By moving nearer the mouth, this destruction will be eliminated.

Third, the spawning season in Cottonwood Creek is later than in other streams in that region and the water is generally diverted for irrigation before our egg collecting work is over, so by moving down this stream, we have an opportunity to operate several days longer each season.

The total number of eggs collected from this station during the last two years was 2,225,000.

CAMP CREEK EGG-COLLECTING STATION.

No changes have been made at this station and none will be required for several years, as everything was put in good condition several years ago and should not require any extra expense to keep the traps in order unless damaged by floods.

The total number of eggs collected from this station in the last two seasons was 3,000,000.

BEAVER CREEK EGG-COLLECTING STATION.

Beaver Creek is one of the large tributaries of the Klamath River, entering the river about eighteen miles west of Hornbrook. Its drainage basin covers a large area and years ago it had one of the largest runs of salmon and trout of any of the tributary streams of the upper Klamath region, but like the river and all its tributaries, the excessive fishing, carried on through an altogether too long open season and the destruction of the spawners by the use of spears and other means has greatly reduced the run of fish in the Klamath as well as in all of its tributaries. There is less than 40 per cent of fish in the river than there was thirty years ago. While there is a large run in the river compared with other streams in California, there has been gradual reduction in numbers, particularly during the last few years since the road was built down the river from Hornbrook to Martin's Ferry. Before this road was built the only fish taken were by local residents. Now they are fished for by thousands of persons and if the season is not shortened, the trout in the Klamath River will soon be so greatly reduced in numbers that there will not be any better fishing than there is in other coast streams that have all been depleted.

During the spring of 1925 a trap was installed in Beaver Creek. Conditions were unfavorable, owing to extremely low water followed by flood conditions that made the operation of the traps uncertain and the results were not as good as were anticipated.

In the spring of 1926 we were more successful and a large run of trout entered the creek, but owing to the size of the creek and the great flood of water that came down at several times during the latter part of March and up to the 15th of April when the warm rains were melting the snow on the upper reaches of the creek, the flood waters could not be controlled with the temporary racks and traps. However, enough were caught and the run studied to demonstrate that there is a large run of trout that enters this creek each spring. So plans were made for a permanent trap and egg-collecting station and the work will be completed early this coming fall so as to be in a position to catch next season's run of trout. The plans for this station consist of concrete

piers to support a splash-board dam with an approach to the tank trap, cottage for the help, and tanks to hold the spawning fish.

The egg take at this station during 1925 was 170,000 and during 1926, 577,000.

BOGUS CREEK EGG-COLLECTING STATION.

There have been no material improvements at this station during the last two years. When funds are available, we recommend that a concrete dam and tank trap be installed in this creek, as during periods of extreme floods in the spring months a great many fish escape up the creek that could be caught if a properly arranged trap was built.

The total number of eggs collected at this station during the last two years was 4,850,000.

SHACKLEFORD CREEK EGG-COLLECTING STATION.

In the spring of 1925, this station was opened as an experimental egg-collecting station in an effort to collect more rainbow trout eggs from the Klamath River tributaries. A rack and trap was constructed and a cabin and living quarters for help built. Shackleford Creek is subject to sudden raises as are nearly all the Klamath River tributaries. Considerable difficulty was experienced during the first season owing to high water, but a fair number of eggs was collected. The station was improved during the spring of 1926 and with the sum set aside for permanent improvements, this station will yield a good take of eggs annually.

The total number of eggs collected during the two seasons this station has been in operation was 3,000,000.

MOUNT WHITNEY HATCHERY.

Mount Whitney Hatchery has kept up its reputation of being one of the best hatcheries on the coast. While it does not compare with Mount Shasta Hatchery in regards to output and size, it turns out annually several millions of fine trout for stocking the waters of southern California as well as the region as far north as the Mono County line. In addition it furnishes golden trout for the Cottonwood Lake section and other streams and lakes in the southern high Sierra, the only place where the golden trout seem to thrive. With the ever-increasing demand for more trout to plant in the streams and lakes of the eastern slope of the Sierra where thousands of persons from southern California find their recreation grounds and enjoy the fishing in this region, this hatchery is not large enough to supply the demands made on it and as soon as funds are available Mount Whitney Hatchery should have an annex built on to it to double its capacity or another hatchery established on one of the streams in that section where the management of the Mount Whitney Hatchery could have supervision over it. All auxiliary or small hatcheries that are located in districts where the physical conditions are practically the same, that is, regarding climate, topography, stream and lake conditions, should in our judgment, be under one management. The foreman and crews should receive their orders directly from the superintendent in charge after the details of each season's work are given out by the head of the

department. This system has been in vogue for the last several years at our different hatcheries and we find that we obtain better results at less expense than where there is a foreman working independently at each of the smaller stations.

We respectfully recommend that the first money available for hatchery construction after the Kaweah Hatchery is built, be set aside for enlarging the hatchery capacity for this region by either building an annex to the Mount Whitney Hatchery or by the construction of a new station on one of the near-by streams as an auxiliary to Mount Whitney Hatchery.

The output of Mount Whitney Hatchery for the biennial period ending June 30, 1926, was 7,177,000.

COTTONWOOD LAKES EGG-COLLECTING STATION.

This station is used for the purpose of collecting golden trout that are conveyed to Mount Whitney Hatchery where the resulting fry are distributed in the lakes and streams of the eastern slopes of the Sierra and in keeping up the supply of fish in the Cottonwood Lakes that are fished excessively each season. During the winter, surveys were made and negotiations entered into with persons owning the land at the mouth of Tuttle Creek with the object of establishing a golden trout hatchery near the town of Lone Pine. The citizens lent every aid possible and were very enthusiastic over the plan, but one of the persons owning land, that was of little or no value at the mouth of the creek, refused to sell or lease the site so the project had to be abandoned for the present. The plan was to collect the eggs of the golden trout from Cottonwood Lakes and convey them to the new hatchery where they could be hatched with other species and thus relieve the Mount Whitney Hatchery and increase the output of the fish to be planted on the eastern slopes of the southern Sierra.

The total number of golden trout eggs collected from Cottonwood Lakes during the last two seasons was 900,000.

RAE LAKES EGG-COLLECTING STATION.

Rae Lakes Station was operated during the season of 1924 and approximately 400,000 eggs collected. Rae Lakes is a fish and game refuge as well as all waters lying south of Fin Dome and all waters flowing into this portion of the lake and all waters flowing into these lakes lying within the sixty lake basin and all waters flowing from said lakes into the south fork of Woods Creek in Fresno County. These streams and lakes should be closed to fishing as a larger number of rainbow trout eggs can be collected if the law is strictly enforced and all fishing prohibited. When this refuge was first established, the fish were found to be in poor condition and only yielded a small number of eggs to each spawning fish owing to the lack of food in the lakes. The altitude is 10,700 feet above sea level and the land as well as the aquatic insects were very scarce. When this condition was discovered, arrangements were made by the Department of Fish Culture to introduce scuds or gammarus with the aquatic plants on which they feed. This plant of fresh water crustaceans with the aquatic plants, made during the summer of 1920, has proven to be a great success, as the scuds have increased

in such numbers that the fish have an abundance of food and are increasing in size as well as producing a greater and better quality of eggs. With these improved conditions, we recommend that the lakes be posted early next season and all fishing prohibited in District No. 26, so as to allow the fish to increase in numbers great enough to furnish a good portion, if not enough eggs, to supply Mount Whitney Hatchery.

TAHOE HATCHERY.

The Tahoe Hatchery has been operated since the spring of 1921. Owing to the extremely cold water and the small amount of dissolved oxygen in the water the growth of the fry is very slow. While they remain as healthy as the average fry in hatcheries, they lack the vitality and do not develop as they do in water where there is a great amount of dissolved oxygen. A plan was made to construct a pond where the water of the springs could be collected and where aquatic plants could grow and where the water would be exposed to the warming rays of the sun and to conduct the water from the pond through an aerating system so that when it reached the hatchery the temperature would be higher and the water would contain a greater amount of oxygen. Funds were provided for these improvements and the plans are made, so that the work will be finished early this fall.

The number of fish distributed from this station in the last two years was 1,885,000.

BLACKWOOD CREEK TANK SYSTEM.

It was decided at a meeting held in Tahoe City during September, 1925, that a system of tanks was to be built on Blackwood Creek where fry could be held until late in the fall, or over winter if deemed necessary, so that they could get the benefit of the water from Blackwood Creek where the temperature was higher and the oxygen content greater, thus giving the fish a better chance to develop. Plans for these tanks have been made and the ponds set aside for the construction of these tanks and water supply. Work will be started during July and rushed to an early completion, so that several hundred thousand fry may be placed in the tanks in charge of an experienced fishculturist in order that they may receive the proper care.

TALLAC HATCHERY.

This station has been operated as in former years. Eggs were collected from the Taylor Creek, Upper Truckee River, and Blackwood Creek traps and transported to this station to be eyed and a portion of them hatched in this hatchery. The remainder were removed to the Tahoe Hatchery, as the water in the Tahoe Hatchery, after July 15th, is better suited for hatching eggs and raising the fish than at Tallac. After the middle of July the water from Taylor Creek, from which stream the hatchery receives its supply, is not suitable for hatchery purposes, but in the spring and early summer this hatchery is an important station for the purpose of eyeing the eggs collected from the auxiliary station or traps, and hatching the first eggs for local distribution. The interior of the building was overhauled and new troughs installed in the fall of 1924. The exterior and cottage should be painted

and new fence built around the grounds when funds are available for this purpose.

The number of eggs collected in 1924 from Ward Creek was 550,000, from Taylor Creek, 455,000, and from Blackwood Creek, 590,000. The number collected in 1925 from Taylor Creek was 135,000, from Blackwood Creek, 590,000.

UPPER TRUCKEE RIVER EGG-COLLECTING STATION.

This station was improved and structure of the trap made permanent during the season of 1925. Permanent cribs were placed in the river and the racks and apron made of better material. A cabin for the help was built and everything arranged in good order for the work during the spring of 1926.

The run of fish in the stream is not as great as in former years, for the same condition that has caused a shortage of fish in all the tributary streams of Lake Tahoe, as well as in the lake, applies to the whole Tahoe basin. Destruction of the spawn fish over a period of many years by market fishermen and the excessive fishing of the small fish in the tributary streams before they have a chance to enter the lake and develop are the causes of shortage. More will be written on this subject later on in this report.

There was collected during the spring of 1926 approximately 500,000 eggs of the large lake trout at this station, which was a good take considering the unfavorable weather conditions that prevailed in the Tahoe basin last spring.

UKIAH HATCHERY.

In January, 1924, a new lease for the Ukiah Hatchery for a period of five years was procured from the trustees of the town of Ukiah. New troughs were installed and the hatchery put in a good state of repair to carry on the work until such time as a new hatchery can be built where there is a larger supply of water to be had. The water supply is getting less each season, due to forest fires denuding the water-shed as well as the effects of the dry seasons on all Gibson Creek and in fact all streams in the state. A new site will be selected where there will be an abundance of water and one which will be centrally located, so that the streams of Mendocino, Lake and Sonoma counties may be stocked from one hatchery and thus save the overhead expense of operating several small stations.

During the biennial period 1,181,765 trout were planted from this hatchery.

SNOW MOUNTAIN EGG-COLLECTION STATION.

This station is located below Cape Horn dam on the South Eel River and before the construction of Lake Pillsbury, furnished several millions of steelhead eggs each season. During light or even normal rainfall, the water is held back by this lake to such an extent that it seriously effects the ascent of the fish in South Eel River. During 1925 and 1926, the number of eggs collected at this station was far below the average. During the spring of 1925, we not only had a shortage of water in the main stream, but an epidemic broke out among the spawn-

ing fish and a large number of them died before reaching the trap. Likewise trouble was experienced in the holding pens. This epidemic was brought on by the low stage of the water during the season of 1924, which did not allow the spawning steelhead to return to the ocean as is their habit. Many of them were confined in large pools on the lower reaches of the river, where they remained in the warm water during the entire season. Their vitality was greatly reduced, and when they attempted to ascend to their spawning grounds on the upper reaches of the river, they were easy victims to leeches and bacterial infections. The loss was so great that we did not get more than 25 per cent of the eggs that should have been taken had it not been for these conditions.

In the spring of 1926, Lake Pillsbury did not fill up in time to allow the steelhead to ascend in their usual numbers and there was not sufficient water allowed to pass the dam to provide for the amount necessary for successful operations at Snow Mountain Station. We are hoping that the coming season will be one of copious rainfall, so that the fish can ascend the stream early and that arrangements can be made with the company to allow a sufficient flow of water to keep the fish in good order in the tanks as well as to give them free passageway through the fishway to the trap.

FORT SEWARD HATCHERY.

There has been a very successful output of fish from this hatchery and considerable repairs and replacement work done. Much of this work has been accumulating, as a shortage of funds did not allow the making of all repairs when necessary. We had to wait until the foreman and his crew could do this work between the period of hatching trout and before the salmon eggs were received. A large fir tree that had been considered safe, fell and wrecked 60 feet of the hatchery roof, a portion of the loading platform and the tram conveyor system which necessitated immediate repairs. Fortunately this occurred at a time when there were only a few thousand fish in the building and there was no loss. One hundred feet of new flume has been built and perforated zinc plate screens have been purchased, an electric alarm system installed between the foreman's cottage and the hatchery, a new overshot water wheel has been built to operate the liver and feed grinding machine and a holding pond for fry has been built in the creek, but more money must be available for the improvement of this creek pond or a new site must be selected if the fish are to be held any great length of time. Probably a series of tanks could be installed that would give better results than ponds built in the creek, particularly as the many boulders and steepness of the river makes it difficult to install the ponds and care for the fish. When funds are available, tanks such as have been built at Blackwood Creek at Lake Tahoe would give better results. The fish make such a rapid development at this station that it hardly seems necessary to recommend a holding pond system to be connected with this hatchery.

The grounds around the foreman's cottage have been improved by the construction of a new fence, a new distributing tank has been built and 90 new troughs built and placed in position. Other repairs and improvements have been made, but in addition to all this a bridge should be built between the hatchery and the railroad and a truck

for the hauling of fish purchased so that the fish can be delivered by truck from the hatchery to the railroad and supplies carried to the station. The tram system should be abolished. This is very important. The foreman of Fort Seward Hatchery is to be commended for his untiring efforts to make a success of the work under these very poor conditions. When the hatchery was built, there were roads leading to Alderpoint from the hatchery as well as to the railroad. The bridges rotted and gave way and high water in the creek carried them away. Funds were not available at the time to make all these repairs, so a tramway with a skip or carrier, operated by a gasoline engine was installed which has been the only means of conveying supplies to the hatchery and the fish to the railroad. This condition has existed for the last five years. It takes over an hour to deliver 15 cans of fish to the railroad by the slow process of conveying on the tramway and then onto a car placed on rails. When going to points south of the

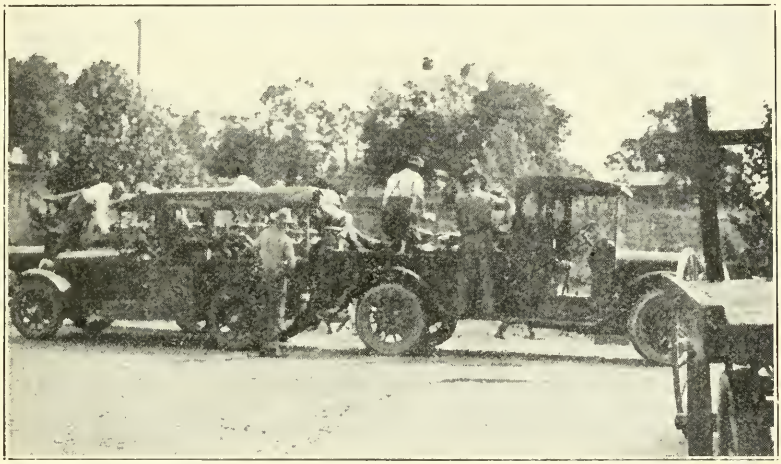


FIG. 7. The Grass Valley Sportsmen's Association loading trucks with fish at the railroad depot. Rapid transportation from the fish car to the stream has minimized loss in fish planting.

hatchery, a hand cart is used from the end of the short car track to a platform so that the cans may be loaded onto the trains.

To overcome all these primitive and out of date arrangements for transportation, the road should be rebuilt between the hatchery and the railroad, a bridge put across the creek and a truck purchased. There should also be a bridge built across Fort Seward Creek above the hatchery to replace one washed and rotted away several years ago, so that the crew can go by earth road to Alderpoint for supplies.

An approximate estimate for these bridges and road work would be $2,000. Any good make of truck would answer the purpose for hauling. It will take at least $4,000 to put this station in such a position that the old primitive and nerve trying way of handling supplies can be discarded.

Besides the above mentioned improvements, there should be some work done on the troughs, a new feed preparing room should be built, a large ice box built, some repairs to the foreman's dwelling are

needed, and an electric lighting plant installed that can be operated with gas engine. All these improvements would aggregate between $5,000 and $6,000. This hatchery is very important in keeping the streams of northern Mendocino, Humboldt and western Trinity counties stocked with fish and it is earnestly recommended that the bridge and truck be furnished as soon as possible and all the other improvements made as soon as the funds are available.

During the past biennial period this station has distributed 498,150 salmon, 3,783,620 rainbow, 1,582,700 steelhead, 108,920 large lake, 160,000 cut-throat, 200,000 black-spotted trout.

BROOKDALE HATCHERY.

All the eggs collected during the last two years from Scott Creek have been held and eyed at Brookdale Hatchery. The number of fish produced from this hatchery average in number approximately the same as in other years. In regards to this station, we make the same recommendations as were made in our last biennial report as conditions have not improved, but continue to grow worse. Quoting from our last report: "Owing to the increasing demand for water from Alba and Clear Creeks which supply the summer residents who have cottages at Brookdale and the drought which has prevailed in this section, and other causes, we deem it advisable to procure more land adjacent to or near the land already owned by the state at Scott Creek Station and construct a modern hatchery with a capacity great enough to supply trout to the counties of Santa Cruz, Monterey and Santa Clara. The land held under lease at Brookdale should be held for the use of holding ponds under the supervision of the foreman of the new Big Creek Hatchery when completed."

The total number of fry distributed from Brookdale Hatchery during the seasons of 1924 and 1925 was 1,445,000.

SCOTT CREEK EGG-COLLECTING STATION.

The number of spawn fish at this station has fallen off considerably during the season of the spring of 1926. In 1925, approximately 3,000,000 eggs were collected from Scott Creek which is the annual average take of eggs at this station. During the winter of 1925, repairs and improvements were made at this station. The conditions of the stream were favorable for an average take of eggs in the spring of 1926, but only 1,300,000 were collected. In the opinion of our foreman at Brookdale as well as others, the numbers of fish are being greatly depleted by the loss of small fish at the pumping plants located on this creek, which in our opinion should not have been allowed to be installed as the creek was set aside by an act of the legislature as a fish refuge. Consequently we do not believe anyone had a right to appropriate the water for other purposes. There has been no effort made to prevent fishing in the creek. Poachers have worked on the stream, both in and out of season and the deadly and destructive spear has been used. We are planning to have a watchman employed by the year to patrol the creek and protect the fish at all times and enforce the law against fishing in Scott Creek. It is hoped that by doing this and by stocking the stream heavily and having the pumping plants properly screened, to restore this creek to its former condition.

CLEAR CREEK HATCHERY.

This station has been operated to its capacity during the last two seasons. The usual repairs have been made. The total number of rainbow trout eggs collected at this station during the biennial period was 3,000,000. The number of fish distributed was 1,359,462.

WARNER CREEK TRAP.

This trap was operated as usual and the eggs taken were sent to Domingo Springs where they were eyed and part of them shipped to other stations, the remainder being hatched and distributed from the Domingo Springs Hatchery.

DOMINGO SPRINGS HATCHERY.

This station has been operated during the last biennial period as in former years, except that the number of spawning fish are getting less owing to the same conditions that are affecting all the streams tributary to Lake Almanor, and that is excessive fishing. To improve conditions at Clear Creek, Domingo Springs and Warner Creek egg-taking stations and hatcheries, we recommend that a large hatchery with a capacity of not less than 3,000,000 fish be established on one of the tributaries of Lake Almanor and that all the eggs collected from Clear Creek, Warner Creek, Rice Creek, and Butt Creek be hatched in one centrally located hatchery where the fish will thrive better and can be better cared for with less expense than where so many small stations situated so near each other are operated.

The Red River Lumber Company has offered the state a site for a large hatchery on the northwest shore of the lake where an abundant supply of water from the North Fork of the Feather River is available for hatchery purposes and for a pond system. A stock of brood fish to furnish eggs for the hatchery when the number of spawn fish in Lake Almanor is reduced is desirable to keep this lake supplied with an adequate number of fish to furnish fishing for the many anglers who frequent this lake each season. Lake Almanor can be kept well supplied with trout if adequate plans for keeping it stocked are taken in time.

This station planted 1,844,722 fish in the last two seasons.

BUTT CREEK EGG-COLLECTING STATION.

Racks and traps were built across Butt Creek in the spring of 1926 near its junction to the outlet of the Lake Almanor tunnel about two miles from Butt Valley Reservoir, but owing to a heavy flood during April, the racks were so badly damaged that the fish escaped and no eggs were collected. A cabin was also constructed for the help. It is planned to improve the racks another season by building a crib in the stream and by using heavier timbers.

PINE CREEK EGG-COLLECTING STATION.

An attempt was made to collect eggs of the large rainbow trout that ascend Pine Creek from Eagle Lake, but it was found that owing to the light fall of snow that melted so rapidly, that the stream did not

keep up long enough for the crew to determine whether or not the run of fish in this creek will justify further expense in an attempt to collect eggs.

FEATHER RIVER HATCHERY.

After carrying on experimental work at this station in 40 troughs under a tent, conditions were found favorable for establishing a permanent hatchery at this place. A lease for a period of 25 years was procured from W. A. Adams. Plans were made and during the fall of 1924 a hatchery containing 60 troughs was constructed and a cottage for the help and a dwelling for the foreman built. This station is located 4 miles from Clio on the Western Pacific Railroad and is only a short distance from the Gold Lake region where there is a number of fine mountain lakes that require stocking each season as well as the streams tributary to the Middle Fork of the Feather River, streams in Sierra Valley and surrounding country and the region along the North Fork of the Yuba River.

The hatchery has turned out a fine lot of fish. The only improvements of any consequence at this station will be the laying of a two-inch pipe line this fall from the settling tank to Mr. Adams' residence as the water from the hatchery flows into the domestic supply and a supply of pure water must be furnished Mr. Adams' residence.

From this hatchery 2,086,100 fish were planted during the biennial period.

BEAR LAKE HATCHERY.

During 1925, operations were started during March by installing the traps in the creeks tributary to Bear Lake. At the opening of the season conditions did not appear to be favorable for a large take of eggs, but as the season advanced, conditions improved and Bear Lake furnished its usual supply of eggs. Of the 5,700,000 eggs collected, 2,700,000 of these were shipped to other streams, 2,000,000 hatched at Bear Lake Hatchery and 1,000,000 at North Creek Hatchery. Reports have been circulated for many years by the resort owners and others that Bear Lake rainbow trout were being exterminated. These figures show conclusively that the system under which we are working at Bear Lake can not be improved. The lake is one of the best examples of fishcultural success in this state or any other state, when the excessive fishing of thousands from Los Angeles and other parts is taken into consideration and the fact that there are thousands of predatory bass in the lake and that all the tributary streams dry up before the middle of July and that all the trout in Bear Lake are the result of artificial propagation and distribution.

The fish are held in the hatchery until the lowering temperature and cold weather drives the large trout and bass into the deeper parts of the lake, then the small fish from the hatchery are distributed in the shallows along the shores where they have an abundance of food. By the following spring, these young fish work into the deep water at a time when the bass and large trout are coming toward the shores to find breeding places. This system has been kept up for the last six or eight years and the results can not be equalled or surpassed by any system in the country.

Improvements were made during the season of 1925 by moving the cabin, remodeling and relining it and painting it on the interior and

exterior surfaces. The troughs, baskets and other paraphernalia were overhauled and painted, wood cut for the coming season and the truck overhauled during the winter.

During 1926, egg-collecting operations were begun in March. At the time this work was started there was no water flowing in any of the creeks, but there was about two feet of snow on the ground. The traps had to be dug out of the snow. Four traps were operated as soon as the melting snow started the streams flowing. A heavy rain storm in April washed the traps out, liberating a great many of the fish. The traps were replaced and there were collected and eyed ready for hatching 4,555,000 rainbow trout eggs. There was a loss of approximately 1,000,000 on account of the heavy storm during April. The embryos at the time of the storm were in a tender or delicate stage and were covered with deposits of sand and mud and in the efforts to prevent the eggs from smothering a loss of approximately 1,000,000 eggs took place. These eggs were eyed in the North Creek Hatchery where the main trap and egg-collecting station is located.

There is quite an agitation by persons not familiar with conditions at Bear Lake, to hold the fish over winter in ponds constructed by fencing off a portion of the lake, as well as in concrete ponds to be built to hold the fish. These plans will not improve fishing in Bear Lake as the present plan under which we are operating has produced remarkable results and it is based on twelve years of experience in keeping this lake stocked under the most adverse circumstances. The reports of our crews who have given this lake careful study verify all the above statements and the writer has been familiar with Bear Lake for over 35 years. The writer planted the first fish introduced into this lake when, as an apprentice fishculturist, he made his first trips planting fish. The fish were carried on mule back over the old trail up the Santa Ana River and planted in Bear Lake.

NORTH CREEK HATCHERY AND EGG-COLLECTING STATION.

All the eggs hatched in Bear Lake Hatchery at Green Spot Springs as well as those hatched in this small hatchery, were eyed and prepared for shipping and hatching in this station. In 1926, 900,000 eggs were hatched in North Creek Hatchery and the resulting fish were planted in the streams of San Bernardino County, together with 100,000 fish that were taken from Bear Lake Hatchery.

GROUT CREEK TRAP AND STATION.

The trap in Grout Creek was operated during the last two seasons with fair results. Large numbers of fish enter this creek, but owing to the great deposit of sand on the flats near its mouth, the stream spreads over such a wide distance during the period when warm rains are melting the snow that it is very difficult to catch the fish. The stream at times reaches a width of a hundred yards and is very shallow. There is no way, except at heavy expense to trap this creek successfully when the floods are on, and that is the time when the majority of the fish are ascending the stream. The traps have been moved and washed out several times during the last few years.

Considerable trouble was had during the last two seasons in operating traps on this creek. The stream generally dries up by the middle

of June and does not start flowing until the following spring. We installed a permanent trap some years ago about one-half mile from the mouth, but the majority of the fish would find spawning beds in the sand below the trap. During an extremely heavy flood a few years ago, the permanent trap was wrecked. Since then, temporary traps and racks have been used. A number of plans have been made to successfully catch the fish in this creek and thus save their eggs, but the best the crews have been able to do was to place a rack in the most favorable place in the old channel and as soon as the spring rains began to melt the snow and the creek reached the flood stage, and to drive the fish back and pick them up wherever possible with dip nets. The hatchery crew, assisted by the game wardens, put in several strenuous days during the spring of 1926 in catching up and saving hundreds of trout that would have perished when the water receded. Thus a large number of eggs were collected that otherwise would have been wasted.

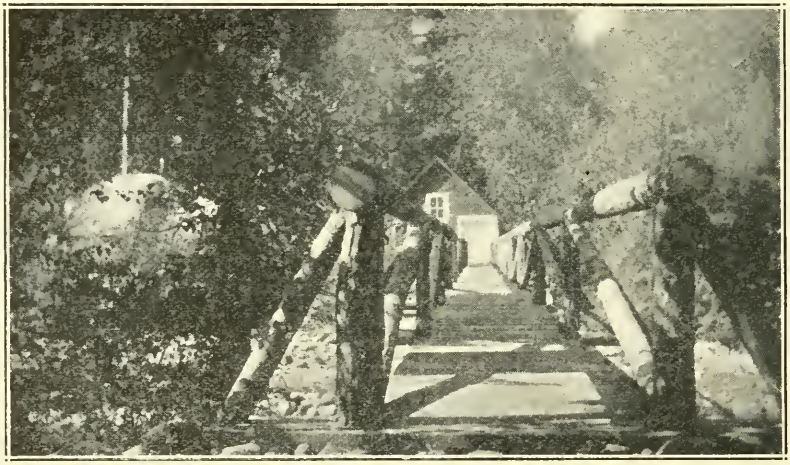


FIG. 8. Wawona Hatchery, output of which is used in stocking lakes and streams to the southward of Yosemite Valley. Photograph by G. C. Tabler.

METCALF, PAPOOSE, KIDD, NORTH AND KEYSTONE CREEKS.

These creeks are all tributary to Bear Lake and all except Metcalf Creek dry up except for a few inches of water that flows in North Creek and Kidd Creek during the summer months. They are all short streams and flow during the spring months when the spring rains are melting the snow or during the rainy spells in the spring months. There is a deposit of granitic sand at the mouths of all these streams and it is very difficult to operate the traps as the fluctuating level of the lake changes the mouths of these creeks. For the last two seasons the surface of the lake has been approximately twenty feet below the crest of the dam. When a condition such as this exists, it is very difficult to keep the mouths of the streams open for the passage of the fish to the traps. Despite all these difficulties we have maintained a large number of trout in this lake by following the plan of planting the fish in the manner described above. A great

many more details could be written on this subject but space in this report is not available.

WAWONA HATCHERY.

This station located on Big Creek near Wawona, Mariposa County, has been in operation for the past thirty years. It has supplied fish for the South Fork of the Merced River as well as for a number of lakes and streams on the south and east of the Yosemite Valley. The total number distributed from this station during the last two years was 337,500 rainbow and 439,300 steelhead.

KAWEAH HATCHERY.

This hatchery has been operated under a tent since it was established in 1919. A permanent building should be erected as soon as funds

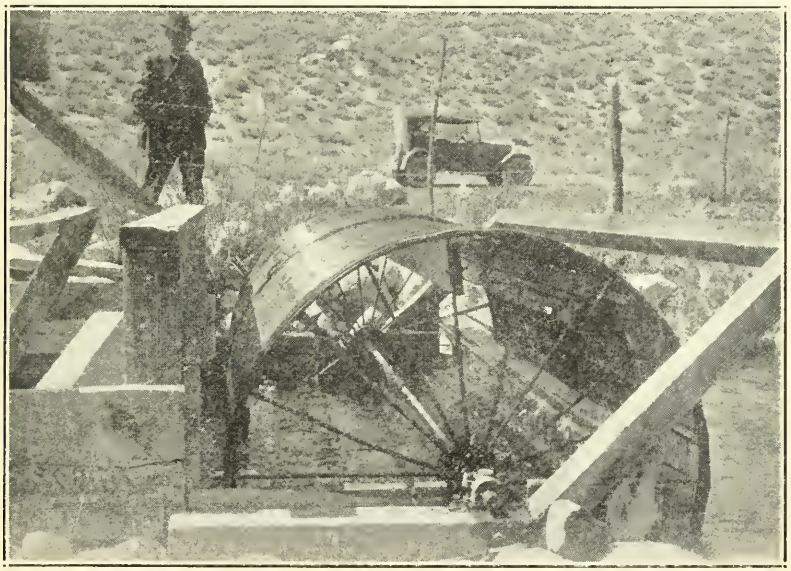


FIG. 9. Fish screen erected by the Cain Irrigation Company at Grant Lake, Mono County. Photograph by A. E. Culver.

are available. During the last season when funds were being set aside for the construction of a permanent building and repairs and improvements to the hatcheries, ponds, etc., we carried on an experiment at the new site on the Kaweah River to determine whether or not the water was suitable for hatchery purposes. The old site at Power House No. 1 of the Mount Whitney Light and Power Company on the main highway leading to Sequoia National Park, proved by years of hatching to have an excellent supply of water, but a number of persons connected with the different sportsmen's organizations in Tulare County were of the opinion that a site at Power House No. 3 would be of easier access when shipping fish as well as being more convenient to the tourist travel. The troughs were moved to a temporary hatchery under a plain frame, covered with paper roofing. We were doubtful whether this site would prove suitable as the water is taken

from the Middle Fork of the Kaweah River which has a higher temperature and contains a greater amount of organic matter. The water supply at the old site at Power House No. 1 is taken from the East Fork of Kaweah River and the writer made an examination of the water at this site and found it suitable for hatchery purposes before any attempt was made to establish even a temporary hatchery. The change from the old site to the new site is proving that the water at the new site is not suited for hatchery purposes. No doubt during the fall it will be necessary to move back to the old site and operate there under a tent until more funds are available for the construction of a permanent hatchery which is badly needed in that section.

The output of this hatchery during the last two seasons was 435,000. In 1924 we distributed 340,000 and in 1925, 95,000 were planted. The

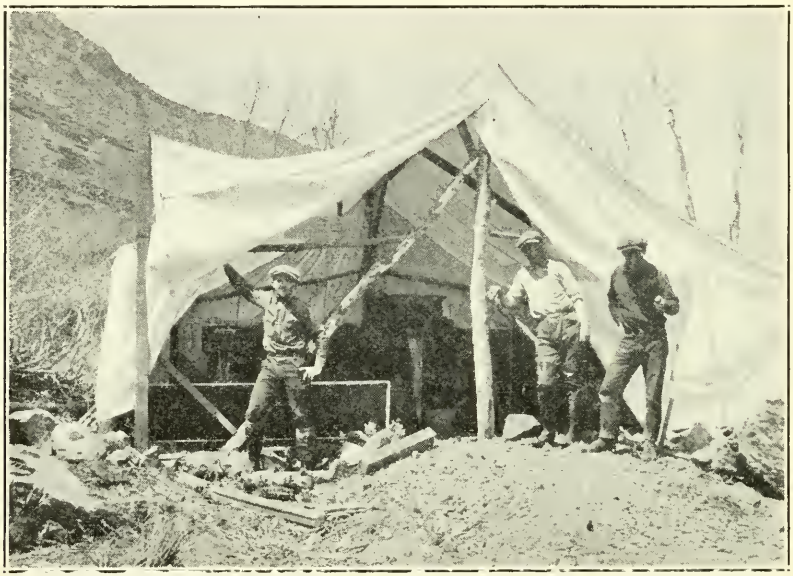


FIG. 10. Experimental hatchery on Rush Creek, Mono County, June 1, 1925. This temporary hatchery is to be replaced soon by a modern hatchery devoted to the rearing of black-spotted trout.

small number planted in 1925 was due to the fact that the water supply was accidentally shut off by a shear board getting loose in the intake box and closing the pipe that furnished the water to the hatchery. The fish perished before the foreman in charge was aware of what had happened. There is an electric alarm system connected with the water supply at all the small hatcheries so that if the water is shut off or the flow is diminished, the alarm bell will ring, thus awakening the help, but on the night that the board closed the intake to the supply pipe, the alarm, for some reason unexplained, failed to work and when an hour or so after the accident, the foreman entered the hatchery nearly all the fish were dead. In 1926 while we were experimenting at the new site an extra man was kept so that during times there was danger of the supply of water fluctuating or of algae floating in the water and causing the screens to choke, some one was always on duty.

RUSH CREEK EGG-COLLECTING STATION.

During the spring of 1925, it was decided to establish an egg-collecting station on Rush Creek, Mono County, to collect the eggs of the black-spotted trout. A trap was placed in Rush Creek, a holding tank was built and a temporary hatchery installed under a tent on Silver Creek. Two traps were installed in Reverse Creek, one in Upper Reverse Creek and the other in Lower Reverse Creek in addition to the main trap in Rush Creek.

The take of black-spotted trout eggs from this operation was very gratifying. The black-spotted trout of this region have an excellent lot of eggs that produce vigorous embryos and develop into strong healthy fish. The take of eggs of black-spotted trout from Rush Creek and tributaries during 1925 was 1,010,000. We were fortunate in procuring an egg-collecting station where eggs from this species can be collected as this excellent fish will thrive in all the lakes in this region. Black-spotted trout to the number of 727,500 were planted from this station. The balance of the eggs were shipped to Mount Whitney Hatchery.

JUNE LAKE.

During the spring of 1926, arrangements were made to seine June Lake for steelhead trout. June Lake was first stocked with steelhead trout in 1921. Fishing did not begin for these fish until the season of 1923. During the entire season of 1924 this lake was fished continuously. Many large steelhead weighing from five to eight pounds were taken. In 1925 the fishing improved as the anglers were taking fish in limit catches. The anglers began catching the fish planted in 1922 and 1923 and caught three sizes of fish (being the result of three years' planting since the 1921 plant) ranging from one-quarter pound to twelve pounds in weight. It was a common sight to see twenty to thirty boats on June Lake during the fishing season and all parties catching fish. The native trout of the lake were the black-spotted trout that would ascend Rush Creek during seasons of very heavy rains and snows. These fish would come up from Grant Lake during the spring when an extra heavy rain and snowfall would fill June Lake so that the water would run from June Lake to Grant Lake. No water has flowed from June Lake to Grant Lake in the last six years owing to the unusual dry seasons that have prevailed in that region as well as throughout the entire state, which has materially affected the fishing in all the lakes and streams in California.

As there are no tributary streams to June Lake, the supply of water being kept up by the melting snow and by rainfall, the steelhead trout have no place to spawn, so it is necessary to stock this lake each season and to catch the spawners with a seine when they approach the shores trying to find a place to deposit their eggs. During the short period that our crews were operating on the lake before the opening of the trout season, 1,000,000 eggs were collected. The crews were only operating about ten days when the season opened, May 1st, and the rush of anglers to this lake drove the fish from the shallow water near the shore and compelled our men to cease their operations. The season on the lake as well as throughout the entire Sierra region should not open until June first. Thousands of spawning fish are taken each season from the spawning beds or on their way to the spawning

grounds by anglers during the month of May. This should be prohibited.

FERN CREEK HATCHERY.

Owing to the successful operation on Rush Creek and June Lake in egg-collecting work and the demand for a hatchery in this section, plans were made to have a permanent hatchery established, centrally located, to supply fish to this now famous fishing region where thousands of persons from southern California and other places spend their vacations. An adequate sum was set aside by the Commission to carry out these plans. Material was ordered during June and the work of constructing the hatchery will be started as soon as it is delivered on the ground.

BURNEY CREEK HATCHERY.

The power development on the Pit River including the construction of high dams and the diversion of the water by the Pacific Gas and Electric Company, has broken up the run of salmon that annually ascended this river to spawn and has prevented the trout from making their seasonal migrations in the Pit River. The company agreed to establish hatcheries to take care of this situation as soon as the Department of Fish Culture should decide on the proper location. During the fall of 1925, surveys for hatchery locations were made and a site for a permanent trout hatchery was selected on Burney Creek on land owned by the company, just below Burney Creek Falls. This is a very desirable site, as the land adjoins the Burney Creek State Park. The location is about one-half mile from the shore of Lake Britton which is formed by the dam constructed for the purpose of raising the water level in Pit River to give it the necessary elevation to operate Power House No. 3 of the Pacific Gas and Electric Company's hydro-electric plant. Plans were immediately made by the Department of Fish Culture which met with the approval of the company and the work of establishing this new station will be started this summer and completed by early fall. The Burney Creek Hatchery will enable the Commission to keep the streams of Pit River basin stocked and the lakes and streams as far north as Modoc County, as well as other parts of Shasta County.

HAGAN FLAT SALMON HATCHERY.

A site for a set of racks and salmon traps was selected at Hagan Flat, Shasta County, for the purpose of collecting salmon eggs and hatching and rearing them, to assist in keeping up the rapidly decreasing supply of salmon. But owing to the uncertainty of the run reaching this far up the river because of the obstruction caused by the dam of the Anderson-Cottonwood Irrigation District at Redding and the diminished run of salmon in the Sacramento River it was decided not to build the salmon station at Hagan Flat until the fishway problem at Redding was settled. Also there is a possibility that it will not become necessary to build a hatchery at this place if the company, in carrying out their projects, will build a road to this reach of the river. All that will then be necessary is the placing of the racks and traps in the river to catch the salmon and convey the eggs by truck to the Burney Creek Station,

where the eggs can be hatched and the resulting fish transported to a point below the last dam or diversion in the Pit River. There are other hydro-electric projects contemplated below Hagan Flat by other interests, that will have to be considered this coming season. If the obstruction at Redding is removed plans should be made without any further delay to establish a salmon hatchery on the Pit River. Early next season this matter should receive attention and action taken to the end that whatever salmon ascend the river can be manipulated for their eggs. Every salmon possible should be hatched and distributed in the Sacramento and tributaries as there is less than 10 per cent of the former breeding grounds of the salmon left. Salmon are decreasing so rapidly that if enough salmon are to remain in our waters to supply the local markets during a portion of the year, the chinook salmon must be propagated to the fullest extent.

BIOLOGICAL WORK.

Under the supervision of Geo. A. Coleman, biological investigations concerning our fresh water food and game fishes have been carried on at Lake Tahoe, Clear Lake, Eel River Basin, Merced River Basin, Lake Elsinore and other places where scientific problems had to be worked out to improve conditions of fish life. Plankton surveys have been made looking toward the introduction of different species of fishes into barren lakes and the improvement of fish-planting work.

This is a very important feature of the work of the Department of Fish Culture and should be continued for a period of years until practical biological surveys of all the inland waters are complete, so that an intelligent distribution of fish can be made. While the department has valuable data on many streams and lakes, there are miles of streams and hundreds of lakes that should be given scientific investigation. New problems are coming up that require special field investigation. The long period of drought has changed the physical conditions of many of our streams to such an extent that it is necessary to have special investigations made to determine whether new species of fishes should be introduced to meet the changed conditions. The denuding of forests, the construction of large reservoirs, breaking up the run of our native species, the holding of the water in large reservoirs causing the temperature to be higher than when the streams flowed unobstructed, and many other conditions brought about by the use of water for the development of the industries of the state have made it necessary that a biologist connected with the Department of Fish Culture be employed to solve the problems that are continually arising.

GENERAL CONDITIONS AND RECOMMENDATIONS.

Open Season. Owing to the excessive fishing in all the lakes and streams of California, it is necessary to find a new source of egg supply to add to the rapidly diminishing supply of adult trout or spawners. Several pond rearing systems for the raising of brood stock from which eggs can be collected should be built as soon as funds are available. The construction and maintenance of large rearing ponds is absolutely necessary to furnish an adequate supply of eggs for the hatcheries.

In particular, the supply of rainbow and steelhead trout eggs is rapidly diminishing, for the adult fish in all the lakes and streams are getting less each year.

The trout in Lake Tahoe suffered a heavy loss from an epidemic of unknown cause several years ago. The fish planted in the tributary streams of Lake Tahoe are caught before reaching the lake and do not have a chance to develop. We earnestly recommend the passage of a law prohibiting fishing in any of the streams tributary to Lake Tahoe, so that the fish planted in the streams may have a chance to remain in the streams until they can reach the lake and there make a growth that will be of some value to anglers. A shorter fishing season must be had if fishing of any consequence is to be maintained in the lakes and streams of California.

The open season for trout should be so regulated as to give the spawning fish every opportunity to deposit their eggs before being caught, and at the same time allow the egg-collectiong stations an opportunity to collect all the eggs possible before the fishing season opens. The season should not be open before June 1st anywhere in the Sierra region. The coastal region should open May 1st and close October 1st. The coastal district should include Mendocino and San Diego counties. In District No. 1½, the season for trout should open June 1st and close November 15th. The use of spears in all districts and the use of fish eggs of any species for bait should be prohibited.

Lake Tahoe. Referring to the conditions at Lake Tahoe, we can not too strongly urge further biological studies regarding the fish in this lake. The excessive fishing for over forty years by the market fishermen before the law prohibiting the sale of trout was passed, the impounding of the water in Fallen Leaf Lake, the diversion of water from the tributary creeks for domestic purposes, the loss of fish several years ago by an epidemic during the winter and early spring have all been contributing to a general depletion of the trout in Lake Tahoe. For reasons that we can not account for the white fish that formerly abounded in the lake by the thousands, have been gradually becoming less and they have not been caught by anglers and fishermen. Years ago, during the breeding season in the fall, these fish would approach the shores in schools of thousands and ascend the Upper Truckee River where they deposited their eggs. There has been a great falling off in the number of fish of these species, for reasons as above mentioned, that are unaccountable. While there has been a fair run of fish in the creeks during the spring months, not many have been caught in the lake during the summer months. The hatcheries have planted an average of 2,000,000 fish each season, but we have not obtained the results that we do in other lakes and streams. A close study of conditions must be made to determine the cause of the apparent shortage of the native species.

The Mackinaw trout were introduced into Lake Tahoe in 1895 at the request of the market fishermen and others, so the writer was informed at the time the eggs were shipped to California. The Nevada State Fish and Game Commission also hatched and planted Mackinaw trout in Lake Tahoe at approximately the same time. The exact date that the Nevada Commission introduced the fish into Lake Tahoe is not known. Some persons claim the Mackinaw trout were introduced

first by the Nevada Commission. As near as the writer can determine the Nevada and California commissions introduced them at about the same time. Some of these fish were introduced into Fallen Leaf Lake where they found suitable breeding grounds as the young of the Mackinaw trout were caught frequently. Very few were taken from Lake Tahoe. Occasionally a Mackinaw trout would be caught, but they were so rare for many years after their introduction, that the writer was of the opinion that they could not find suitable grounds on which to spawn and that the few that were taken, descended from Fallen Leaf Lake to Lake Tahoe. Mackinaw trout do not ascend the streams to spawn, but deposit their eggs on reefs in water from 4 to 6 or 8 feet in depth. As such places are unknown in Lake Tahoe, it was supposed that the Mackinaw trout would never be taken in any numbers, but during the last seven years, 24 years after their introduction into the lake, they are appearing in ever-increasing numbers. This summer they were being caught at many different places in the lake. They have evidently found suitable breeding grounds and are increasing rapidly. The Mackinaw trout is one of the large charrs, native of the lakes of northeast America. The type introduced into Lake Tahoe are natives of Lakes Superior and Michigan. They are a good food fish and afford sport for those who enjoy trolling for fish in deep water. Occasionally they reach a weight of from 50 to 60 pounds, but the average weight of the adults is about 20 pounds. As they are piscivorous in their habits, devouring a large number of other fish, they will have an abundance of food in Lake Tahoe because of the countless millions of minnows and chubs. As they inhabit deep water during the greater portion of the year, they may not devour as many of the native species of trout as is generally supposed, but a biological survey and a study of their habits will be carried out this coming summer to determine what proportion of their food is composed of the native species of trout and what proportion is minnows and chubs.

Hat Creek and Fall River. Considerable comment has been made regarding the conditions on Hat Creek and Fall River and the absence of screens in the canals leading to the power houses operating on these streams. This department has always contended that the trout in Fall River and Hat Creek were nonmigratory and that they do not descend these canals and pass through the impulse wheels of the power plants and thus get destroyed as is claimed by others. The nature or physical condition of these streams, in our judgment, has changed the habits of the trout to such an extent that they do not migrate from one portion of the stream to another or pass out of the streams into Pit River. The water in these streams comes from large springs that furnish the entire flow of Fall River. A greater portion of the water in Hat Creek above the Power Company's canals comes from Rising River, a short river that rises from a large spring in the lava. Rising River is only two miles in length from its source in one of the largest springs on the coast to where it unites with Hat Creek, a stream that rises on the north basal slopes of Mount Lassen. The fish in Hat Creek above the confluence of the two streams, do not descend the stream to where the main streams flow into the junction, nor do the fish in Rising River ever leave the main stream, except the emaciated and dying spawn fish that die each year after their efforts to propa-

gate their species. Then the weakened and dying fish drop down the stream where they are found on the grizzlies at the head of the canal. The same condition exists in Fall River. The reason, in the opinion of the writer, for the nonmigratory habits of the fish in these two streams, is that the temperature varies only slightly in comparison with the Pit River and other streams in this region and the flow is constant. There is but a very small difference between the maximum and minimum flow in each of these streams. The water is not affected by the flood conditions as the streams are short, receiving their supply from the large springs which have a constant head throughout the year. The aquatic insects and crustaceans on which the fish feed are abundant, the water is nearly all clear, seldom, if ever, getting riley. All these and many other physical conditions relating to the stream beds, velocity of the water, etc., all have a tendency to cause these fish to acquire habits that make them nonmigratory. The writer has studied the conditions in these streams and the habits of these fish for many years and is satisfied that his judgment is correct. But to make an absolute test to either prove or disprove that the writer has not made an error regarding the habits of the trout in these two streams a rack-screen will be installed below Power House No. 1 of the Pacific Gas and Electric Company. For this experiment, the Commission is working in conjunction with the power company. The cooperation of the Bureau of Fisheries has also been obtained and the foreman of the Baird Hatchery has been instructed to assist in the investigation. Members of the sportsmen's associations will be requested to assist in checking up on this experiment to determine beyond any question of a doubt whether there is any loss caused by the trout passing through power wheels, and if so, to what extent.

This experiment will be carefully checked by the biologist of this department, Mr. Geo. A. Coleman, so that if any fish are found on the rack-screen, the cause of death can be determined. If only emaciated and dying spawners show up, which can be easily determined by dissection and study of the anatomy of the fishes, it will be unnecessary to screen the canals leading to the power houses that receive their water from Hat Creek and Fall River. But on the other hand if healthy fish in normal condition are found on the racks, it will be necessary to have proper screens installed at the intakes to the canals leading from these two streams. It is planned to keep the rack-screen in place for a period of approximately one year so that every condition of seasonal change that might possibly cause the fish to descend into the canals can be observed and data gathered.

Spiny Rayed Fishes. Owing to the great demand on our trout streams, we deem it advisable to establish pond rearing systems for the propagation of such food and game fishes that will thrive in the warmer waters of the state. Properly constructed ponds and nurseries for this purpose will be built and the rearing of these fishes placed in the hands of experienced pond culturists. Several millions of the spiny-rayed fishes can be raised each season and distributed in suitable waters the same as trout are distributed. This would add greatly to the fishing attractions of the state and relieve the rush of anglers to our trout lakes and streams.

Holding Ponds and Rest Stations. Owing to the demand of a number of sportsmen's associations, for the raising of trout to a larger

size before being distributed, arrangements are being made where these associations may construct ponds and hold the fish until late in the fall before making the distribution. This experiment will be carefully watched and a check made to determine whether the system is practicable and whether better results are obtained than the system of planting No. 1, 2 and 3 fingerlings directly from the hatcheries.

Several of the sportsmen's clubs have established rest stations or small holding ponds in the mountainous parts of the state where the fish are delivered from the distribution cars and held for several days to enable them to recuperate from their trip from the hatcheries. They are then taken by pack animals and other conveyances to the more inaccessible lakes and streams. This system has been carried on with good success, particularly by the Fresno County Sportsman's Club who have placed the work of distributing the fish in the hands of experienced planters. Other associations as well as some of the boards of supervisors are planning to adopt this system of resting the fish before carrying them to the waters in the higher elevations not accessible to the trucks.

In conclusion, the demands on this department of the Commission as well as on all other departments, makes it necessary that we have a great deal more money than is now available and it is up to the sportsmen if they desire to maintain good fishing in the lakes and streams of the state, to increase the licenses and to protect the spawning fish by a later opening season and a shorter one in most districts.

REPORT OF THE DEPARTMENT OF COMMERCIAL FISHERIES.

By N. B. Scofield, In Charge.

Since making our last biennial report there have been a number of changes in the Department of Commercial Fisheries. In July, 1924, it became necessary to employ an attorney for the impending litigation with a few canners and reduction plants in their attempt to have the fish reduction act declared unconstituional. B. D. Marx Greene was employed as special counsel for the department, where he remained until January, 1926, when he was appointed to the position of executive officer of the Commission.

I can not praise Mr. Greene too highly for his quick grasp of the highly technical details of the sardine canning and reduction industries and his knowledge of the rather special field of fish and game litigation. Added to this was his excellent handling of all the cases in the courts. One of these, in the State Supreme Court (*State of California* vs. *The Monterey Fish Products Company*) resulted in a decision by that court which is nation wide in its importance.

After Mr. Greene's appointment as executive officer, the Commission was reorganized. This reorganization was of considerable importance to the department of commercial fisheries, in that it brought about a more business-like arrangement whereby the departments reported through the executive officer instead of to each separate commissioner according to which part of the state was in question. This did away with one policy in the enforcement of laws in one part of the state and a different policy in another part of the state.

A department of patrol was formed which took over the commercial fisheries patrol in San Francisco and on San Francisco Bay which had been in charge of the department of commercial fisheries. The Department of Commercial Fisheries kept the commercial patrol which operates out of the department's offices at Monterey, San Pedro and San Diego. The department also gave up its work on bay and harbor pollution which was taken over by the new Bureau of Bay and Harbor Pollution.

Captain H. B. Nidever is in charge of the commercial patrol for southern California with headquarters at our San Pedro office. Mr. Nidever is especially well qualified for this position. He has been with the Commission on fisheries work for eighteen years, and has been with this department since its organization.

Our last biennial report told of the rapid growth of the sardine fishery in this state during the time of the war, reaching its peak in 1919; and of the slump and decline of the fishery in 1920 and 1921, due in large measure to marketing conditions in foreign countries; how the lowest ebb was reached in 1921 and then the rapid rise until in 1923 the sardine catch was equal to that of the banner year of 1919 and the state's fisheries as a whole were likely in a short time to equal the mark reached through the stimulus of the war. This prediction has been fulfilled and during the past two years the total production of the fisheries, during either of the years, has exceeded that of any year in the history of the state. The total catch of all fish for the year 1924

was 327,645,017 pounds and in 1925 it was 414,753,312 pounds. The fluctuation in total catch for the past several years has been caused by the fluctuation in the sardine catch. The total catch of fish, other than sardines, remains fairly constant. This is well illustrated in figure No. 11. The total catch of all species of fish together with the amount of the fish pack and of all fishery products is given in the appendix to this report. We are quite sure that California's fisheries for both volume and value of the products exceed that of any state by a good margin.

SARDINES.

The sardine fishery is now the most important of our fisheries industries. It is the most variable in quantity of fish caught and it presents more complicated problems to the state's administration than any other. The large profits to be made on fish meal and oil from sardines, together with the state's policy of confining the use of sardines to the production of human food, has caused most of the trouble. Each cannery had its own by-products plant and the more sardines they turned into fertilizer and oil the greater their profits. The law prohibited the use of food fish for reduction purposes, but provided that sardine canners could use up to 25 per cent of the catch in their by-products plants, the percentage to be allowed each season to be determined at hearings held before the Fish and Game Commission. It was found that this law was very difficult to enforce, for there were too many ways in which its provisions could be avoided. We therefore recommended in our last report that this law be redrawn and that the hearings before the Fish and Game Commission be eliminiated and the amount of sardines which it is legitimate to use in the by-products plant be definitely fixed in the law. It was also recommended that the penalty for violation be quick and severe.

In the fall of 1924, before this law could be amended by the legislature, the Monterey Fish Products Company, an independent reduction plant, attacked its constitutionality on the ground that it permitted a canner to use sardines in a reduction plant but did not permit a reduction plant not operated by a canner to receive sardines direct from fishermen, and was therefore discriminatory. This case went to the State Supreme Court where it was decided that the law was constitutional. This decision was not rendered until March, 1925. In the meantime the canners and the Fish and Game Commission had agreed that the law should be amended and with that object in view one or two conferences were held and it was agreed with the canners that the law should be amended so as to do away with the hearings before the Commission and to put teeth in the law so that a violator could be stopped at once. The amount of overage was to be 25 per cent based in some way on the capacity of the cannery. The Commission's attorney was to draw up the bill and submit it to a future conference or to representatives of the canners and the canners were to stand with the Commission against those who would exploit the state's supply of sardines for the making of fertilizer and oil. Two other factions were asking that the law provide for them. One was a company which wished to use a reduction process to produce fish flour for human consumption.

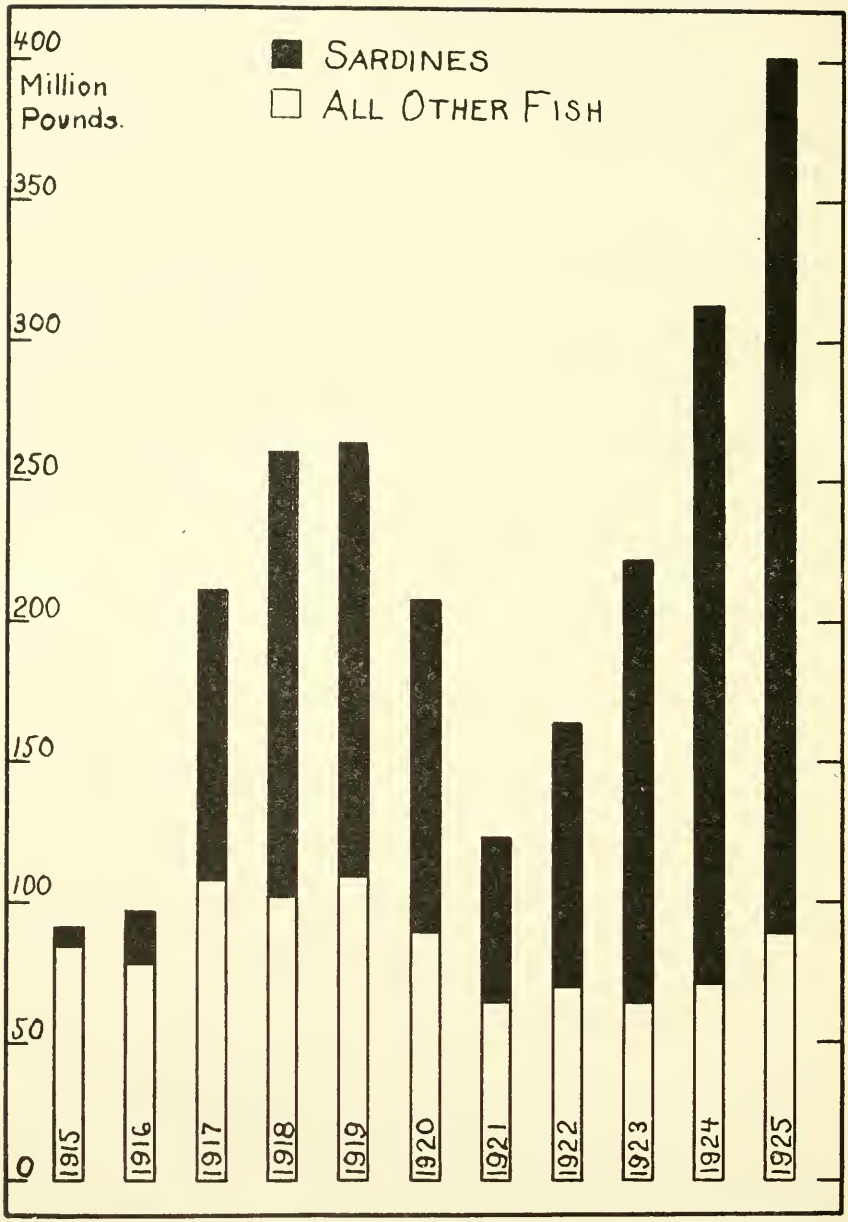


FIG. 11. Graph showing the catch of sardines and all other fish from 1915 to 1925. In 1925 the sardine catch amounted to more than three times the total catch of all other fish combined.

The other faction wished to use a reduction process to extract sardine oil to be used in connection with vegetable oils for human consumption.

At the legislature of 1925 the out-and-out reduction interests, backed by state organizations which wished a cheap fertilizer, showed a great deal of strength and before the bill of the canners was put in final form by the Fish and Game Commission's attorney, the canners became alarmed and entered into a compromise agreement with the reduction interests under which an independent reduction plant could receive five hundred tons of sardines per month for reduction purposes, and the canners were to get sardines for their reduction plants up to 25 per cent of the canning capacity of their canneries. The manufacturers of sardine oil and fish flour for human food were also to be taken care of. The Fish and Game Commission was asked to agree to this compromise with the explanation that if the Commission did not agree to this the reduction interests would go after a wide-open reduction bill and that the canners would join with them. This stand was backed by all of the southern California canners and by about half of the Monterey canners. It was the Fish and Game Commission's belief that under the circumstances its opposition would not prevent the passage of a wide-open reduction bill, so it elected to remain neutral with the understanding that the Commission's attorney should put the teeth in the bill for its easy enforcement. The attorney also drew up the entire bill in accordance with the agreement between the canners and reduction interests. When the bill came up before the Senate Fish and Game Committee the Commission stated its attitude of neutrality. The committee, however, showed itself to be opposed to the idea of allowing independent reduction plants to exploit the sardines and a subcommittee was appointed for the purpose of amending the bill. The final result was the elimination of the provision whereby independent reduction plants could use five hundred tons of sardines a month. The bill provided that canners could use sardines in a reduction plant up to 25 per cent of their canning capacity and the capacity was to be determined by the number of pound oval can closing machines installed and intended to be used during the season. For each such machine installed they were to get one hundred and fifty tons each month for reduction purposes. The bill also provided for the manufacture of food from sardine oil and from fish flour. This bill passed and became a law.

When the question of enforcing this law came up in the fall of 1925 it was found that many of the canners believed the law gave them the right to run one hundred and fifty tons of sardines a month in the reduction plant for each line of pound oval closing machines installed whether they ran them or not, and a number of them put in extra lines of closing machines to increase their capacity and enlarge their reduction plants accordingly. The Commission believed the special privilege to canners was based on the good faith of the canner and that he must run his machines to capacity to get his capacity allowance for reduction. In an attempt to reach an agreement with the canners on this matter, all canners were invited to a conference at the Commission's office in San Francisco, but it was poorly attended and no agreement was reached. The Commission finally decided to enforce the law on the theory that to be entitled to the 25 per cent for reduction purposes the canner

must operate each machine to capacity and that if he operated it at less than capacity his allowance was reduced accordingly. To make it simpler of enforcement, the Commission notified the canners that it would consider they had complied with the law if they canned what would amount to 75 per cent of the catch. This was apparently satisfactory to the canners at Monterey, where the sardine season commences in July, but when the season began later in southern California the canners in the Los Angeles district organized to contest the Commission's interpretation of the law. The litigation lasted throughout the season, during which time the canners adhered very closely to the Commission's order.

The first decision of importance was given by the appellate court in Los Angeles, which declared the allowance of one hundred and fifty tons for each line of closing machines to be unconstitutional; but the decision did not state whether the whole special privilege to canners was unconstitutional or just the method of determining capacity.

A later decision in the superior court of Los Angeles County was to the effect that canners were still entitled to 25 per cent of their capacity, but did not enlighten us as to what constituted capacity—whether it was what they actually canned or what they could can. This matter of what constitutes the capacity under the law came up still later in the superior court of Los Angeles County. The judge's decision was still somewhat ambiguous, but he did say that the essence of the matter was the good faith of the canner, and that if his machines and other necessary equipment were not ready and intended to run, his capacity was reduced accordingly. Both sides have claimed a victory as a result of this decision. It would appear, however, from the decision that if a canner was prepared in good faith to run at his claimed capacity he would have to operate up to that capacity before he would be entitled to any overage. This interpretation would give the canner less overage that he would have under the Commission's old order giving him 25 per cent of the catch.

During the past sardine season of 1925-1926, we were able to hold down the percentage of sardines used in reduction plants much better than any previous season in spite of the continued litigation. The amount used in reduction plants was a little less than 25 per cent of the catch, and the pack of canned sardines was greater than the season before although the total catch was less.

A good market has developed for our sardines and the canners, most of them, have changed their attitude in regard to the amount of overage they should have. The time seems right to fix in the law a definite limit to the amount of sardines a canner can divert to his by-products plant, and this amount should be made as low as is possible. What the canners need more than anything is to organize and through a selling agency, or some other legal means, stabilize the price of canned sardines.

During the sardine season of 1925-1926, which lasts from July to March at Monterey and about November to March in southern California, the sardines were abundant during the first two or three months at Monterey but thereafter at Monterey and during the entire season in southern California, the fishermen had difficulty in getting enough to keep the canneries busy. If it had not been for the purse seine fishermen, the season would have been about a complete failure in southern California. These boats being larger can fish farther away from their home port. They had not operated on sardines to

any extent before, but when the smaller boats with their lampara nets could not supply the canneries they took a hand. They located sardines near Santa Cruz Island, eighty miles to the north of San Pedro, and from this distance delivered enough sardines throughout the season to save the day for the canners.

In the negotiations between the fishermen and the canners over the price to be paid for sardines during the coming season of 1926-1927, the purse seines have been used as a threat against the lampara fishermen to keep the price down. This more especially applied to Monterey. The price last year was $10 per ton. The fishermen asked $12.50 a ton this season, finally compromising on $11, but not until after two purse seine boats had been brought to Monterey, where purse seines had not been used for quite a number of years. The comparative efficiency of these two methods of catching sardines will be watched with interest.

The provision in the law whereby a reduction process may be used to convert sardines into human food, provided one-half of the wet weight of the fish is used in the process, was taken advantage of by the Bayside Fish Flour Company at Monterey. The fish flour has so far been exported although the company hopes to create a home demand. This process is about the same as in the manufacture of fish meal for fertilizer or stock feed, but it differs in that the ground meal is pressed through fine boulting screens, thus eliminating the bone and all but the finely pulverized muscle fiber. This process is looked upon more or less with suspicion by some of the canners, for it is a reduction process and not much more expensive than the process of making fish meal for fertilizer.

The provision in the law under which sardines may be taken for the oil, provided the oil be used for human consumption, was taken advantage of by two companies—the Globe Cotton Oil Mills of Los Angeles and the Hauser Packing Company of Los Angeles. We believe that this provision of the law is dangerous and contrary to the legislature's policy of confining the use of food fish to the production of human food. The amount of oil in sardines averages about 15 per cent of the wet weight of the fish and so long as this small percentage is used for human food the rest of the fish can be and is used for fertilizer or stock feed. The demand for animal fats such as sardine oil is almost without limit so that there is danger of an immense reduction industry getting started in the state which will seriously deplete the supply of fish and injure the canned sardine industry, the first to be established, the one giving the most people employment and the one which the state has sought to protect. We are confident that if sardines can not be taken directly for this purpose, means will be employed to utilize the oil from the by-products plants of the canneries and we believe that the best policy for the state to pursue, from the standpoint of conservation, is to confine the production of sardine oil to that which may be obtained from the by-products of the sardine canneries.

SALMON.

In our report of two years ago we told of the failure of the law which was designed to stop salmon trolling during certain closed seasons in the sea districts. As recommended in that report, the legislature amended the law but this law has again proven defective. The

superior court in Marin County decided that a law is not good which closes one district to the possession of salmon caught outside the three-mile limit while an adjoining district is open. One uniform closed season for the entire coast would not give the salmon the desired protection, for the fish "run" progressively later from Monterey Bay north.

The closed seasons for salmon trolling in the ocean were established in an attempt to save the salmon from destruction, but as has been explained, the law has twice proven defective and the salmon have not received the protection so greatly needed, so that even if those closed seasons could now be made effective the protection would be far from adequate. There are not sufficient salmon remaining to support commercial fishing both within the bays and rivers and in the open sea. Either the outside or the inside fishing should be stopped and to delay further will be fatal. Of the two alternatives, the outside, or sea trolling, should be the one to go. There are many good arguments on both sides of the question, "Should the outside or the inside fishing be stopped?" but the better arguments are for the inside fishing and against the outside fishing. The three main arguments are:

1. The great destruction of immature salmon by sea trolling.

2. Impossibility of regulating the catch of salmon belonging to any one stream so as to maintain the supply of that particular stream race of fish if they are caught in the ocean without knowing to what stream they belong.

3. The industry first started on the river where fishing villages have been built up and where other kinds of fishing can not be turned to, while the fisheries of the ocean are undergoing rapid development and where there are other fisheries to which salmon trollers can turn their attention.

Observations relating to the life history of king salmon have been systematically continued since 1919. A considerable amount of information relating to growth, age, migration, and general habits has accumulated. Some of this has appeared in published form from time to time and other reports are in process of preparation. Both ocean and river catches have been under observation and information has been obtained that will presumably assist in matters of conservation. The work has been under the direct supervision of J. O. Snyder of Stanford University who has been ably assisted in field work by E. C. Scofield and G. H. Clark.

In cooperation with the International Pacific Salmon Investigation Federation an effort was made last year and again this season to place metal tags on adult salmon caught and released at sea. No success followed the first effort, but the second was more fruitful. King salmon to the number of 130 were tagged by Paul Bonnot and C. Rogers in Monterey Bay and off the coast in the vicinity of Eureka. If tagging operations of this kind could be successfully carried out, the results should inform us as to the origin of the ocean catches and furnish data relating to sea migrations, growth, and other matters of importance.

The Commission was represented at the meetings of the Federation which were held in Seattle. Representation here insures cooperation on the part of the state in its investigations.

An outstanding feature of the salmon investigation is the experimental work, part of which has been designed to better acquaint us

with the return migration of fishes which have been artificially propagated. An experiment which promises some results of interest and value is now approaching completion. The experiment was initiated in 1922 when, under the direction of Captain Lambson, eggs were collected, fertilized, and placed in the hatchery at Fall Creek, a tributary of the Klamath. The resulting fry were placed in ponds where they were carefully reared by Mr. E. V. Cassell who afterwards superintended their distribution. The distribution of the fish previously marked was performed in such a way as to give the probable results of the experiment an opportunity to demonstrate whether or not returning fish will seek out and enter certain tributaries in which they were reared or introduced. Upwards of 500 marked fish were secured during 1926, all of which will serve to contribute largely to our knowledge of the migratory habits of king salmon both in the ocean and rivers. Equally good results are expected in 1927 when fishes of the ages of 4 and 5 years will return. This experiment, full details of which are given in California Fish and Game, Vol. 10, No. 1, involved the marking of 153,000 yearling salmon.

The successful completion of such an experiment depends largely upon cooperation on the part of those engaged in fishing, as also officials of the Commission, and results to date have been very satisfactory.

That work of a similar nature may be carefully controlled and kept under more constant observation, it is desirable that an experimental hatchery be provided. It is not necessary that such a hatchery be given over entirely to experimental work of such a nature as to prevent or even seriously interfere with its immediate function as a regular station for artificial propagation. Such a station should, however, be under the direct supervision of an investigator who may plan and supervise the execution of experimental work relating to propagation and distribution. Work on species other than salmon might also be carried on to advantage in such a station. For example, in the pursuit of the salmon investigation, advantage has been taken of every opportunity to study the trout, particularly the steelhead, and some data of value has accumulated. A correct interpretation of some of this data rests upon experimental work and stream observation of an inseparable nature, which might be accomplished with profit, if the facilities of a properly located hatchery were made available.

SHAD.

Shad in the Sacramento and San Joaquin rivers were greatly depleted by heavy fishing during the war, at which time there were no closed seasons or other measures to give them protection. A closed season was adopted which was first in effect during the shad run in the spring of 1918. This protection and later the addition of two more weeks to the closed season has resulted in the steady increase of these fish. The quick response of these introduced fish to restrictive fishing measures is remarkable and almost unique. We know of no other fishery where the recovery has been so quick and so unmistakable.

STRIPED BASS.

Striped bass have been given a great deal of added protection during the past ten years and at the 1923 session of the legislature a very

great added protection was given by adding two weeks to the spring closed season. Each two years, when the legislature met during that period, some measure was passed to give striped bass more protection without waiting to see the result of the protection given two years earlier. As the striped bass do not spawn until they are four years of age, no noticeable effect of a protective measure could be seen in two years, except possibly in an increased number of very young fish. The measure of 1923, adding two weeks to the closed season, did not go into effect that year until late July, which was after the spawning run

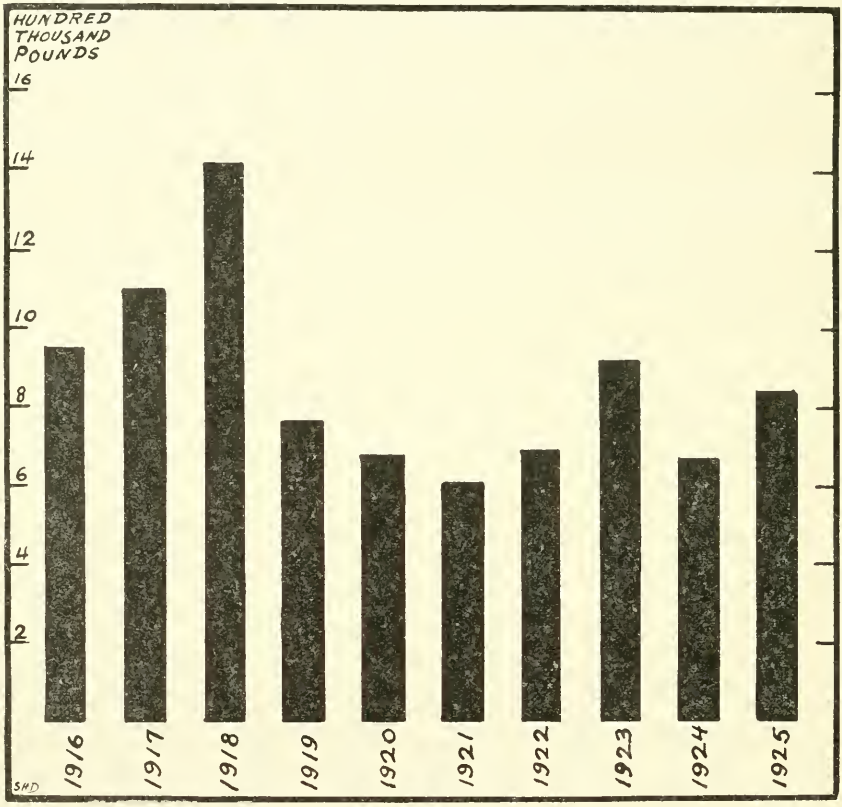


FIG. 12. Graph showing the annual catch of striped bass from 1916 to 1925.

of bass was over for that year, so that we can not have any four-year fish, which average a little less than three pounds, resulting from the spawning fish first protected by the two weeks closed season, until in the year 1928.

To give striped bass more protection now would not only be taking action without awaiting the results of the last legislation, but it would be done in the face of good evidence that the bass have already responded to the protection given them in the years prior to 1923 and are now actually increasing in abundance.

To get at the abundance of any species of fish through the individual opinion of anglers or commercial fishermen is to be very inaccurate, and at best the result can be only a rough guess unless there is some system for recording the many separate experiences of fishermen and analyzing the data thus gathered. It so happens that we have a system of recording the catches of commercial fishermen—the best that is in existence in any state. This system was put in by state law some eight years ago for the very purpose of determining the increase or decrease in the abundance of any species of fish which is being utilized for commercial purposes, and to do away with guesswork. This system, which gets every commercial fisherman's daily catch together with the type of fishing gear used, gives us the best measure which is known for determining the abundance of fish. The evidence from these records shows that striped bass are not only holding their own but are actually increasing in numbers. And we have not yet had time to experience the benefit from the two weeks added closed season.

PURSE SEINES.

About ten years ago purse seines were introduced into southern California, where they worked almost entirely out of San Pedro. Their first success was in catching bluefin tuna, but they caught a number of other kinds of fish, among them barracuda, of which they occasionally made very large catches, and there were times when they killed more fish than they could get aboard their boat. The catching of barracuda by these purse seines was objected to very strenuously by the barracuda gill net fishermen of San Diego. They took their fight to the legislature in 1923 and got a bill through both houses which would have prohibited the possession of a purse seine with less than four-inch mesh. If the Governor had not vetoed this bill, the purse seines would have been unable to catch small fish like the barracuda, mackerel or sardine. Under those circumstances it would not have paid them to operate, and they would have been eliminated entirely.

At the 1925 session of the legislature the same bill was passed again, this time without opposition, but was held up by the author and a compromise measure was put in another bill sponsored by the Fish and Game Commission, which prohibited purse seines or round haul nets from being used to catch barracuda. This became the law in July, 1925.

It was claimed by the opposition to purse seines that they caused great fluctuations in the price of barracuda and that if purse seines were eliminated the gill net fishermen could supply the markets with barracuda during the winter months as well as the purse seines were doing it. It did not work as the gill net fishermen claimed. The fluctuation in the price of barracuda has been much greater since purse seines were barred from catching these fish, and the gill net fishermen have not been able to supply the markets during the winter, as they claimed they would. This is shown very clearly in a report by Joe Craig, assistant in the State Fisheries Laboratory. As this purse seine controversy is a very important one from a number of standpoints, we are publishing the report of Mr. Craig.

Purse seine boats are larger than the average sea fishing boat in this state and for that reason are highly desirable for relieving the

fishing grounds adjacent to ports by fishing farther banks than the smaller boats can.

As the fisheries of San Diego and San Pedro expand, that expansion must take place largely in Mexico. The purse seine boats are of advantage in this distant fishing. During the past sardine season, as already described under the title of "Sardines," these boats were a great boon to the sardine canners of San Pedro in bringing sardines from a distance when they were scarce near at hand. If the four-inch mesh bill for purse seines had become a law at the last legislative session, the sardine season would have been a disastrous one for the San Pedro canners.

INVESTIGATIONS.

The work on king salmon has been continued under the direction of Professor J. O. Snyder of Stanford University. Efforts to secure marked fish have continued with some success. The first experiments

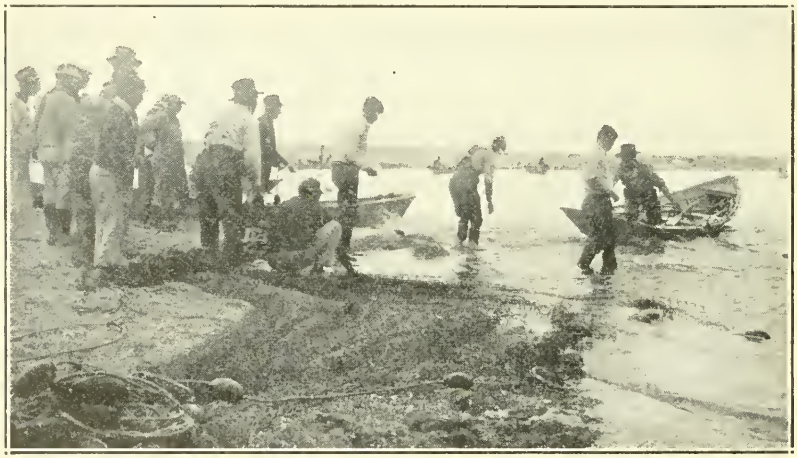


FIG. 13. Seining salmon for marked fish at the mouth of the Klamath River. A study of returned marked fish has greatly increased knowledge relative to the age, rate of growth and migrations of the king salmon. Photograph by Mrs. Ruth K. Roberts.

in marking troll caught salmon were undertaken in order to definitely determine the native stream of the salmon found in the ocean along the north coast. Briefly summarized, the investigation has shown:

Pond bred king salmon return from the ocean to the stream in which they were reared.

Salmon return to the stream in which they were reared rather than to that of their real parentage.

In seeking the parent stream on their return migration, they may pass the mouths of other rivers in which the same species is native.

The nuptial migrations of individuals with the same stream history, but of different age groups, are very regular in time.

Artificially propagated king salmon appear to reach about the same age and stature, and to attain about the same yearly growth as others.

There is evidence which leads to the inference that king salmon after entering the ocean may remain together in the same locality or migrate in the same school for one or more years, possibly throughout life.

King salmon may range a long distance at sea from the mouth of the parent stream, a discovery of importance in relation to conservation.

It can be seen, therefore, that as a result of marking experiments, a great deal has been learned regarding the salmon's range at sea from the different rivers. Consequently, with this data at hand, the Commission is in a far better position to properly regulate river and sea fishing for salmon in order that the salmon run may be conserved.

Scale studies of the half-pounder of Eel River, which has been believed a salmon by many anglers, is in reality a steelhead trout, approximately three years old, which has entered the river on its first nuptial migration. If this fish is allowed to spawn and escape the dangers of the river, it may return again and again, each time greatly increased in size and presumably with a larger egg-laying capacity. With this knowledge, angling should be so regulated to provide sufficient safety for the needs of the steelhead trout in the Eel River.

Also under the direction of Dr. Snyder, investigations relative to the age and rate of growth of the striped bass as evidenced by scale studies have been started by E. C. Scofield. These studies have shown that a majority of bass mature in their fourth year and at a size which escapes through the nets of minimum sized mesh, set at $5\frac{1}{2}$ inches.

REPORT OF THE STATE FISHERIES LABORATORY.

By W. L. Scofield, Acting Director.

In the last report (twenty-eighth Biennial Report, pages 14-15 and especially pages 53-71), the nature and purpose of the research program of the department was so clearly set forth that the present report may well confine itself to the developments during the last two years.

Of the thirty-five or forty fisheries of California that rank as important, but eight or ten species are the subject of research by the department, due largely to a lack of available funds and trained personnel. The policy has been to confine the work to a rather limited field where reliable and fundamental work may be accomplished rather than to attempt to cover superficially a larger field.

The work of the State Fisheries Laboratory is intended as a basis for future work of the department. As an essential part of the program, it is striving to establish the principles governing the fluctuations in abundance of the fish supply and the methods by which the first signs of overfishing may be detected. This attempt to establish fundamentals is best developed in a still more limited field.

The chief work of the laboratory has, therefore, been largely confined to the two most important species of the state, the sardine and the albacore. Although valuable contributions have been made by the laboratory concerning other species, such work has been more in the nature of meeting emergency requirements, rather than the determining of underlying principles to serve as a basis upon which to build future work.

Personnel.—Since the submission of the last report, the personnel of the laboratory staff has changed greatly. The director, Mr. W. F. Thompson, was honored by being chosen to direct the halibut research work of the International Fisheries Commission, with headquarters at Seattle, and is now on leave of absence from the state while so engaged. Mr. Thompson, however, continues his albacore research work for the state, and, by means of frequent visits to the laboratory, continues to give valuable assistance in directing and advising as to the carrying out of the research program. During his absence, W. L. Scofield is acting director of the laboratory.

But two of the former staff members remain, the vacant places having been of necessity filled by inexperienced students. The staff has been enlarged from seven to ten; but of these ten, only three are as yet capable of independent research work. The condition noted in the twenty-eighth Biennial Report (page 56) is even more apparent now. As soon as workers have received sufficient training to do effective fisheries research, they are attracted elsewhere by more promising positions, at higher salaries than the state is now paying for this specialized investigative work. Since the demand for such workers is increasingly great, it is obvious that we will have to offer greater inducements to such men if we hope to retain a nucleus of trained research workers.

Students, under the personal direction of an experienced man, are capable of doing the field work of gathering the necessary statistical data, but only trained men of specialized experience are capable of

doing the analysis and investigative work that will produce results from the data gathered. The research work of the laboratory is now seriously handicapped by the lack of experienced men. This situation promises to become more, rather than less, acute in the future, due to the increasing demand for men of training in such work.

In addition to the state employees, there are now three members of the laboratory staff employed by the International Fisheries Commission, United States-Mexico; one of whom is receiving training in research methods, and two are engaged in the arranging and filing of the state's records of catch.

Sardine Work.—The sardine catch of California outranks, in pounds landed, the commercial catch of all other fisheries combined, by three to one, and promises to increase in importance and to maintain its lead over all other fisheries for many years in the future. This is the chief reason for our concentration of research effort on the sardine fishery.

The results already attained form the entering wedge to our understanding of the complex changes occurring in our sardine fishery. Summaries of these results are to be found in the five reports assembled under the title Fish Bulletin No. 11.

The data for more detailed analysis are at hand, but fisheries experts of advanced training are necessary for this follow-up work, and at present such men are exceedingly difficult to find and hold. With the staff available, this work is being pushed as far as possible. The sampling and analysis of the catch at semiweekly intervals is being continued, and the observations will be summarized after the close of each fishing season.

Albacore Work.—The results of several years' observation and research work on the albacore catch are now being prepared for publication by Mr. W. F. Thompson. An analysis of boat catches over a period of years will form a part of his report. Regular daily observations of the catch of southern California for the three summer months will be continued.

Pismo Clam Work.—Since the publication of Dr. Weymouth's Fish Bulletin No. 7, on the Pismo Clam, the work has been continued and a surprisingly rapid depletion of this species has been clearly demonstrated. The evidence is now being prepared by W. C. Herrington for publication in bulletin form as one of the Fish Bulletin series.

Striped Bass Work.—Biological and life history research of the striped bass is being carried on by E. C. Scofield under the direction of Professor J. O. Snyder at Stanford University. In addition, a preliminary boat catch analysis covering the last eight years has been prepared at the laboratory by J. A. Craig. Although this boat catch analysis is preliminary in nature it is planned that the catches of this species will be subjected to further analysis, and together with similar work done on albacore, the results may be summarized in bulletin form, so that the relative merits of the various methods of analysis can be contrasted, to serve as a guide to possible future work along such lines.

Miscellaneous Research.—Various secondary research problems have received attention during the last two years; for example, observa-

tions on the catches of rock fish and smelt. Such work, in the absence of intensive study, will require an accumulation of observations over a period of years before the results should be summarized. In the meantime, the preliminary information so gained will serve as a valuable basis for future work on these species in case the program is enlarged to include these fisheries.

Publications.—During the last two years four Fish Bulletins, numbers 8, 9, 10 and 11, have been issued, as well as various magazine articles appearing in the quarterly, California Fish and Game.

Fish Bulletin No. 8 by Mr. Carl L. Hubbs of the Museum of Zoology; University of Michigan, deals with racial and seasonal variations in the Pacific herring, California sardine and California anchovy. Fish Bulletin No. 9 by Dr. Tage Skogsberg presents in bulletin form the report on the purse seine industry of southern California. Fish Bulletin No. 10 by Dr. Frances N. Clark (now returned to the staff of the laboratory) deals with the life history and spawning habits of the grunion. Fish Bulletin No. 11, as already noted, deals with the California sardine and includes five reports on research work done by members of the laboratory staff. Two of these reports are by W. F. Thompson, and one each by O. E. Sette, Elmer Higgins and W. L. Scofield. More detailed reference to the character of the work reported in these four bulletins is contained in the last biennial report (pages 56-58).

Statistical Data.—As explained in previous reports, the statistical information on the fish catch and fishing industries, as gathered by California, is unique because of its completeness and accuracy. Valuable and necessary information is systematically collected covering the fishery products, investment in canning and fishing equipment as well as the types of boats and fishing gear used, but the distinctive data for value and completeness are to be found in our catch records. These show not only totals for each species for each locality, but in addition show the individual boat catches daily. These records are the foundation for our knowledge of the fisheries of the state, and much of the research work is dependent on data taken from our so-called "pink ticket" boat catch records.

During the last two years much progress has been made toward further systematizing the collection and proper filing of these records, as well as the correction of minor errors or omissions, with the result that this information as a whole is of an increasingly high standard of reliability.

The presentation of this information to the public has necessarily been somewhat neglected while the plans for collecting the data were being perfected, but the time is now ripe for publishing the results obtained from our statistical system in more detail, together with summaries and graphs to make the information more readily grasped by the people of the state. Plans for such publications are now under way.

LIBRARY FACILITIES FOR FISHERIES RESEARCH AT THE CALIFORNIA STATE FISHERIES LABORATORY.

Accessions.—Noteworthy improvements in library facilities for ichthyological and fisheries research have been made at the California

State Fisheries Laboratory during the past biennium. Over 100 books were purchased, and an aggregate of about 90 sets or parts of sets of serial publications were received between July 1, 1924, and July 1, 1925. At least eighty of these were obtained in exchange for Fish Bulletins Nos. 2-10, and various reprints from California Fish and Game. Most of them are series of which no numbers were previously in the library. In addition, a great many separate back numbers, odd volumes and reprints have been obtained to fill out partial sets already in the library. Since July 1, 1926, another 20 exchanges have been arranged, eleven new subscriptions have been started, and a large number of other items have been requested.

Several hundred volumes much in need of binding are now well bound, so that loss of loose pamphlets is prevented, and the books are protected from dust, as well as being much easier to consult than they were formerly.

Card Bibliography.—Considerable progress has been made in building up a useful card bibliography. This has as its basis the cards on fish printed by the Concilium Bibliographicum. These represent a number of books, and more than eight thousand scientific papers from no less than eight hundred and thirty-five distinct serial publications. They have been prepared by consulting whatever volumes (from 1896 to date) of various series which happened to be available to the Concilium's staff. At first thought one might easily suppose that here was everything for the period covered that a scientist investigating fishes could possbily desire. However, it has been found, by careful analysis, that these cards give very incomplete access to fisheries literature. For our work they are accordingly being supplemented by printed cards from the Library of Congress, John Crerar Library, Queen's University Library, and other sources, and, when these fail, by our own typed cards. All are being combined into one alphabetic arrangement. When this is brought up to date, it will enable an investigator to locate articles by species, by subject and by author. (In most large libraries he would be able to find *books* on fishes in this way, but not the articles in specialized scientific periodicals.)

Union List.—A red star on the card shows when a paper sought is to be found in this library. If it is not here, reference to the recently published "Union List of Periodicals in the Libraries of Southern California" often locates a copy in some nearby library, which may be obtained by inter-library loan. The above publication, which lists some of the holdings of the California State Fisheries Laboratory, is a very useful document, and the California Fish and Game Commission may compliment itself upon having helped to finance its publication costs.

Care has been taken not to duplicate unnecessarily work already well done by the editors of the various printed indexes to zoological publications. It is intended to have our catalog furnish additional aids which these guides lack.

Distinctive Service.—The library collection now contains the equivalent of about twenty-five hundred volumes. Its highly selected character is one of its most significant features. There is no attempt to acquire complete sets of journals unless they are largely devoted

to marine biology. Many separate numbers and volumes from general scientific series, are, however, on the shelves, since these contain papers of importance to fisheries investigation. The result is that in a relatively small space is concentrated a quantity of material, all of which bears more or less directly on the subjects that are of primary concern to the users of the library. Working at a university library, our men usually find that in order to assemble the various papers needed for a particular problem, they must consult two or three different departmental libraries as well as the general university collection. This annoyance is of course spared them here. Our distinctive contribution to fisheries research is, therefore, satisfaction of the specialized demands of scientific work in a limited field. A university librarian can not possibly give so much attention to *all* of the many interests he must serve, and therefore he usually gives it to *none* of them.

The fact that a number of investigators working at various points along the coast for other commissions, not infrequently come to the California State Fisheries Laboratory to do their reading, is evidence that our service is appreciated.

Future.—Prospects for library development during the coming fiscal year are very encouraging. Apparently more funds are available for 1926 than were for either 1924 or 1925. The plan is to employ a full-time librarian with zoological training and a clerical assistant, whereas the work of the past two years has been handled by this assistant and a librarian who worked, on the average, only about three days a week. The records are now in such shape that progress in both ordering and cataloging is much easier than it was in 1924. The obvious needs of the library, aside from the acquisition of more volumes, are further work on the card bibliography, binding, and subject classification of the reprint collection. If present plans are carried out, and adequate support is maintained, the library should increase its usefulness very greatly before the 1928 Biennial Report goes to press.

REPORT OF THE LEGAL DEPARTMENT.

By B. D. Marx Greene, Attorney.

Prior to January, 1926, the legal work of the Commission was handled by a general attorney with headquarters at Sacramento and by an attorney for the Commercial Fisheries Department with headquarters at San Francisco. In January, 1926, upon the reorganization of the Commission, the two legal positions were consolidated with that of the executive officer, and an assistant attorney, Ralph W. Scott, was appointed to serve at San Francisco.

The legal work of the Commission is divided into certain main classifications:

1. The prosecution in the justice's court of cases involving violation of fish and game laws where assistance is requested by district attorneys of counties. This usually happens when technical provisions of the law are in question or when a jury has been demanded. Usually the game wardens prosecute their own cases and do not call for assistance unless some unusual legal question is presented or a jury is demanded.

2. Superior court actions for injunction brought in the name of the people of the State of California through the office of the attorney general in which the attorney for the Commission appears of record and actually handles the legal proceedings.

3. Actions commenced in the superior court against the Commission, or individual employees of the Commission in their representative capacity, either to compel the performance of a certain duty or to enjoin the Commission and its officers from performing some specific function.

4. Original applications to either the appellate or Supreme Court to compel the Commission to take action or to desist from taking action.

The following is a summary of cases handled by the legal department of the Commission during this biennial period:

SUPREME COURT.

People vs. *Monterey Fish Products Company*, 69 Cal. Dec. 261. Decided March 4, 1925.

Action brought in the superior court of Monterey County for injunction to prevent defendant from operating an independent reduction plant using sardines for fertilizer purposes. The superior court decided in favor of the defendant. The case was appealed to the Supreme Court and reversed. This is now one of the leading cases in California and the nation in regard to state ownership of fish and game in its sovereign capacity and lays down certain general principles relative to waste of food fish and the right of the state to regulate its taking and use.

In re Berto, 69 Cal. Dec. 420.

Original application to the Supreme Court for a writ of *habeas corpus* upon the ground that the offense charged in the original cause in justice's court was insufficient because it failed to allege that the beach net or seine which was being used in violation of law was used for the particular purpose of taking and catching fish. This decision liberalized the law and makes it much easier hereafter to charge similar

offenses. This case is interesting because the Commission convicted the defendant in justice's court and appeal was taken to the superior court of San Mateo County and the judgment sustained. A request for a writ of *habeas corpus* was made to the appellate court and denied and, finally, the same question was passed upon by the Supreme Court in this case.

In re Angelo Biardo, 69 Cal. Dec. 420. Same as above.

In re Jack Biardo, 69 Cal. Dec. 420. Same as above

In re Cerruti, 69 Cal. Dec. 420. Same as above.

In re Spurtino, 69 Cal. Dec. 420. Same as above.

DISTRICT COURT OF APPEAL.

Van Camp Sea Food Company vs. *Newbert et al., Commissioners,* 49 Cal. App. Dec. 38. Decided December 23, 1925.

This was an application for *certiorari* to review an order of the Fish and Game Commission regulating the amount of fish used in the manufacture of fertilizer by fish canning plants. The Commission contended that the application should be denied because the act of the Commission was not of such a judicial nature as to justify a proceeding *in certiorari.* The court held that the Fish and Game Commission had no right to exercise judicial functions and if, therefore, in fact, this function attempted to be exercised by the Commission was either judicial or quasi-judicial, the writ would not lie.

Stafford Packing Company vs. *Newbert et al.,* 49 Cal. App. Dec. 41. Same as previous case.

Pacific Marine Products vs. *Newbert et al.,* 49 Cal. App. Dec. 41. Same as previous case.

Southern California Fish Corporation vs. *Newbert et al.,* 49 Cal. App. Dec. 41. Same as previous case.

Los Angeles Sea Food Products Company vs. *Fish and Game Commission,* 49 Cal. App. Dec. 41. Same as previous case.

Franco-Italian Packing Company vs. *Newbert et al.,* 49 Cal. App. Dec. 41. Same as pervious case.

Van Camp Sea Food Company vs. *Newbert et al.,* 49 Cal. Dec. 362. Decided February 25, 1926.

This is a companion case to the other Van Camp case above, but here the plaintiff seeks mandamus to compel the Commission to issue a new order relative to the amount of fish to be used for manufacture of fish meal. The court, however, adopted the interpretation of the fish reduction act claimed by the Fish and Game Commission and declared that portion of it unconstitutional on which the plaintiff relied. The demurrer to the petition was therefore sustained and the writ discharged.

People vs. *James A. Makings,* No. 1323, First Appellate District, Division Two. Decided May 17, 1926.

An application for a writ of *habeas corpus* directed to a constable of Sausalito township to secure release of petitioner from custody on a charge of transporting crabs from fish and game district 1½. This raised the question of the constitutionality of section 623 of the Penal Code which prohibits the exportation of crabs from certain designated districts in northern California. The constitutionality of the law was upheld and the writ denied.

SUPERIOR COURT.

People vs. *Globe Cotton Oil Mills.* Action filed in the superior court of Los Angeles County in January, 1925, for an injunction to prevent the defendant from using whole fish for reduction purposes to make an edible oil product. On February 3, 1925, the injunction was granted as prayed for in the complaint. Subsequently, when the new reduction act was passed by the legislature in 1925 the action was dismissed.

People vs. *Hovden Company.* This action was filed for an injunction October 23, 1925, in the superior court of Monterey County as a result of alleged overuse of sardines for reduction purposes by the defendant. Temporary restraining order granted and on November 14, 1925, by stipulation injunction *pendente lite* granted restraining defendant until further order of the court from violating the orders of the Commission relative to the amount of fish to be used for reduction purposes.

People vs. *Pacific Marine Products.* Action filed in the superior court of Los Angeles County January 29, 1926, to prevent the defendant from using fish for reduction purposes in violation of law. Action still pending.

People vs. *Gilbert Van Camp.* Same as previous case.

People vs. *Italian Food Products Company.* Same as previous case.

People vs. *Franco-Italian Packing Company.* Same as previous case.

People vs. *Battagalia et al.* In the superior court of Marin County. Appeal from the justice court of Sausalito township involving a question of illegal use of nets. Action still pending.

Lowe vs. *Carpenter.* In the superior court of Glenn County for injunction to prevent seizure of 270 geese used as decoys. Action still pending.

CASES INVOLVING INSTALLATION OF SCREENS.

A large number of injunction cases are pending at the present time to compel the installation and maintenance of fish screens in irrigation ditches and canals. Very few of these cases have been pressed since the reorganization of the Commission, as a new bureau has been installed to care for these matters and a general survey of the state is being made at the present time. Until this survey is completed most of the cases have been left in abeyance.

CONDEMNATION OF NETS.

Under section 636*a* of the Penal Code, it is the duty of the Fish and Game Commission to commence proper proceedings in the superior court to condemn all nets seized for violation of the fish laws. In compliance with this section the Commission instituted 73 separate proceedings in the courts of this state for such condemnation and in each instance obtained from the superior court an order of condemnation.

OPINIONS.

In addition to the court proceedings, the legal department of the Commission renders numerous opinions, both formal and informal.

Also, for the guidance of the Commission, we are greatly indebted to U. S. Webb, Attorney General of the state, who has at all times cooperated with us to the fullest extent in handling such legal proceedings as were necessary, and in giving us formal and informal opinion, suggestions and advice.

REPORT OF THE BUREAU OF EDUCATION AND RESEARCH.

By Harold C. Bryant, In Charge.

EDUCATION.

Lectures.

A greatly increased demand for lectures has been noticeable during the past biennial period. Outstanding has been the demand from service clubs. Numerous conservation lectures have been furnished Rotary, Kiwanis, and other service clubs. School requests have also been unusually heavy. Although the majority of lectures have been given at high schools, yet grammar schools have come in for a fair share. Boy Scout and Camp Fire organizations have been furnished numerous lectures and field trips. As in the past, contributions to scoutmasters and leaders training courses have been considered most valuable in that through the training of leaders the gospel of conservation is more easily spread. In the spring of 1925, six lectures on fish and game were given in a university course in Forestry 1, as in former years.

Preceding Christmas, 1925, the San Francisco *Bulletin* imported a team of reindeer from Alaska. These deer attached to a sleigh and accompanied by a Santa Claus were shown to thousands of San Francisco school children. Since the exhibition to schools gave a worthwhile opportunity to give a lesson in big game conservation, a lecturer was furnished by this bureau. After a discussion of the life history and habits of the reindeer attention was called to the need for conservation of other members of the deer family.

Under the direction of the county superintendent of schools, Sonoma County teachers emphasize bird study during the fall months. Last year, this special study ended with a midwinter contest participated in by children throughout the county. A lecturer from this bureau showed various common birds on the screen and the children were expected to write down the name. All those who accurately named twenty-five or more birds were given a badge.

Three lectures have been broadcasted over the radio. Returns have shown large audiences not limited to California, but distributed throughout the west. Executive officer, B. D. Marx Greene, has also utilized this means of carrying a message to western sportsmen and nature lovers.

Considerable aid in the educational program has been given by employees outside the Bureau of Education and Research. In recent months the commissioners themselves have given many talks before fish and game protective associations and the executive officer has been especially active in aiding this necessary work. Lectures have also been given by Rolin G. Watkins, in charge of publicity, Jay Bruce, state lion hunter, and August Bade, superintendent of the Yountville Game Farm. Talks in schools and before other organizations have been given by many of the deputies.

Reference to the following table will show a total of 166 lectures with an attendance of 42,366. This added to the total attendance for the summer resort work makes a grand total of more than 137,000 persons who have heard a conservation message by medium of the spoken word.

Attendance Record Lectures, Bureau of Education and Research, July 1, 1924, to June 30, 1926.

Organization	*Number of lectures*	*Attendance*
High schools	47	21,295
Grammar schools	10	3,850
Universities and colleges	11	2,160
Civic and public	21	6,065
Service clubs	17	1,090
Fish and game protective associations	10	914
Boy Scouts, Campfire Girls, etc	15	1,694
Radio	3	----
Miscellaneous	27	2,298
Motion picture film only	5	3,000
Totals	166	42,366

FIG. 14. A group of Boy Scouts from Oakland who received field instruction on game and game conditions while visiting Yosemite National Park, summer of 1926. Photograph by B. C. Cain.

NATURE EDUCATION.

Attempts have been made to stimulate the teaching of nature study and conservation in the public schools. Through a committee at the University of California, nature study work has been actively espoused. Emphasis is especially needed now since the law, making nature study compulsory in the public schools, was repealed at the 1925 session of the legislature. Thousands of helpful publications have been furnished school teachers at their request. Every opportunity has been taken through interviews to encourage teachers to emphasize nature study and conservation. A large number of donations of birds' eggs and other specimens have been made to various schools and museums for use in objective teaching. Many loans of lantern slides have also been made to teachers.

Aid to various boy scout organizations was also furnished through activities in supervising the passing of bird study and conservation tests. At least three employees of the Commission have been actively

engaged as examiners. A training class for scouts wishing to pass bird study and conservation tests was given instruction two different terms. Campfire girls and girl scouts were given like help.

During the fall of 1924, preceding the referendum on the Klamath River Fish Reservation, an extensive campaign of education and publicity was instituted. Numerous publicity items were furnished the newspapers and many lectures were given. Undoubtedly this campaign played a definite part in our having the victory which helped to save the fish resources of the Klamath River.

Summer Resort Educational Work.

Continuing the cooperative arrangement with the National Park Service, nature guide work has been continued in Yosemite National

Fig. 15. Yosemite School of Field Natural History pursuing field studies in Yosemite National Park. This school, run in cooperation with the National Park Service, is one of the contributions to nature education being made by the Bureau of Education and Research of the Fish and Game Commission. Photograph by Mrs. Elizabeth Fitzgerald.

Park each summer. The work has grown continuously and a staff of seven or eight men is now necessary in order to serve the thousands of people who make use of the nature guide service. It is undoubtedly the largest effort in popular nature education yet undertaken. It has been gratifying to note its spread to other parks. Through the medium of lectures and campfire talks, field trips, exhibits and office hours, the service attempts to awake vacationists to natural history opportunities and to their responsibility as regards wild life conservation.

From the standpoint of accomplishment there are three things that stand out as a result of the last two summers' activities of the Yosemite Nature Guide Service: a training school for nature guides and teachers;

extension of the program to back country camps and increased interest and attendance.

Twenty students were enrolled in the Yosemite School of Field Natural History each session. The course included a six weeks' study of living forms in their natural environment plus a week's study of conditions at higher elevations. These students have gone back to their occupations filled with worthwhile knowledge of fauna and flora and with new ideas relative to conservation. What they learned will be passed on to the students in their schools and to their friends, thus widening the field of endeavor. In this group will also be found trained men and women capable of starting similar educational work in other summer resorts another year. A special campfire with natural history lore as a special attraction was another innovation.

It was possible the past two years to place a nature guide at outpost stations, thus giving equal opportunities to those staying at back country camps. Though numbers handled were smaller at these outposts, compensation was to be found in the more intimate contact and the notable enthusiasm. At the higher elevations mammal life is more abundant and opportunities for study of the more unusual forms more frequent. Angling conditions being better, a study of fish life and protective measures necessarily became easier.

More than seventy-five applications for the 1927 session of the school have been received and consequently the limiting of the number to twenty is becoming increasingly difficult. A similar school is to be started next year in New England by a former member of the Yosemite staff.

Attendance Record,
Yosemite Nature Guide Service,

	Field trips		*Lectures*	
	Number	*Attendance*	*Number*	*Attendance*
July-August, 1924	120	1,679	142	21,534
May-August, 1925	494	9,912	303	49,590
May-June, 1926	126	2,682	100	23,923
Totals	740	14,273	545	95,047

Editorial and Publications.

During the biennial period eight numbers of California Fish and Game have been issued, two of which were special numbers, the Klamath Conservation Number issued July, 1924, and a Striped Bass Number, April, 1926. A special article by Jay Bruce, state lion hunter, entitled, "Problem of Mountain Lion Control in California" attracted more than ordinary interest and there has been continuous call for copies of this article. Volume 11 contained 202 pages and 48 illustrations. Separates were obtained of eight of the more important articles. Call for such separates is continuous.

The edition continues to be 7500 and close to 6500 of each edition are mailed to libraries, schools and individuals. There has been considerable call, especially from libraries, for needed copies to complete sets. We regret to report that the supply of the first number, issued in 1915, is entirely exhausted and the supply of several numbers is limited and consequently distributed only to libraries that wish to complete their files.

The 1924 biennial report comprising 112 pages was compiled and issued in the fall of 1924. Three Fish Bulletins, numbers eight, nine and ten have had our editorial supervision. Teachers' Bulletin number eight, "Fish and Game Laws and the Reasons for Them," was issued in the spring of 1926 and judging by the numerous requests from schools has filled an important need. Plans are being made for the revision of "Bird Study in the Public Schools." Miss Gretchen Libby, the author of this bulletin which is now out of print, was employed during the month of June, 1926, to partially prepare the bulletin for republication. Hundreds of requests for this bulletin are on file and it will be a pleasure to again be able to fill these orders.

More than twenty-five popular and scientific articles have been published in various periodicals. Among the subjects treated were Fish Resources of the Klamath River, Hawks That Are Blacklisted, The Lion Hunter of San Lorenzo, Maintaining a Supply for the Creel, and Nature Guiding.

MOTION PICTURES.

The end of the fiscal year finds this bureau with a partially replenished library of conservation films. Certain of the Salisbury films first secured in 1915 have been entirely worn out and those which replaced them have also become worn and scratched. It was possible during 1925 to secure an additional copy of the colored motion picture film showing operations at the Mount Shasta Hatchery. In the spring of 1926 a new reel showing some non-game birds and additional material for game bird reels was purchased. This together with personally taken material gives us eight reels in fair condition. Effort has been made to secure negative as well as positive so as to more readily replace worn reels. There is still need for replacement of worn films. Particularly is there needed a film portraying the work of state lion hunter, Jay Bruce, and operations at the Yountville Game Farm. It is expected that these will be secured during the coming year.

A regular booking system recently installed has helped in handling the increasing demand for the Commission's educational films. Films borrowed by the Associated Sportsmen's Clubs have been used on a circuit with a resultant large attendance record. Three different farm advisers borrowed films and used them regularly for weeks at a time.

During the first six months of this year, twenty-five loans were made in addition to the use of films at scheduled lectures.

ROUTINE OFFICE WORK.

Through the years this bureau has had charge of the issuance of scientific collector's permits. In December of each year, the reports of 150 collectors in the state are filed and new permits issued. In most instances, scientific collector's permits are limited to a small number of birds and their issuance is based largely on the actual scientific or educational use to be made of the specimens.

A compilation of hunting accidents has been made and published annually.

Attention has been given the care and filing of sportsmen's magazines and other publications. All such publications are arranged in chronological order and are available for reference. Likewise, a large collection of photographs has been filed and indexed. The complete card index record of the Commission's publications is up to date.

PUBLICITY.

For some time the Commission has needed wider publicity as to its accomplishments and plans. This was finally attained in the spring of 1926 and a separate Bureau of Publicity was established relieving the old bureau of the newspaper publicity. Previous to that time, numerous items on activities of the Commission and on conservation were prepared and mailed to the newspapers. A check showed that these items were widely used by newspapers throughout the state.

Publicity was further attained through lectures, the State Fair exhibit, motion pictures, radio broadcasting, loan of photographs and cuts, and through numerous conferences.

RESEARCH AND INVESTIGATIONS.

Progress has been made on the stomach examination of ducks, looking toward a final report on the food of ducks in California; however, this important project is still incomplete. A number of miscellaneous stomach examinations of birds have been made and the data filed, likewise, a number of identifications have been made for various persons and reports submitted.

During the summer of 1924 special study of the relation of birds and animals to the the foot and mouth disease was made and a report written. Also, the conditions on Lower Klamath Lake were investigated at the request of the United States Biological Survey and a full report rendered.

Several post-mortems made on ducks dying from a peculiar disease in the Sacramento Valley showed the usual signs of alkali poisoning. Splendid help from the veterinary department of the University of California is acknowledged. A number of quail reported as having been poisoned were sent to a chemist and an analysis was made. The results were negative.

In the fall of 1925 quail poisoning experiments conducted by the Associated Sportsmen of California were watched with resultant profit.

Again it was demonstrated that quail may consume large proportions of poisoned grain without injury.

A so-called "madstone" taken from a deer sent in for identification proved to be a hair ball and led to a study of the subject. Attention has also been given to the range of individual deer and a report made on evidence secured from a belled animal.

Efforts to improve the research resources of the bureau have been continued. Pertinent material is continuously filed according to subject, and articles appearing in bulletins and magazines are bibliographed.

OUTSTANDING FEATURES OF EDUCATIONAL PROGRAM.

1. Numerous lectures illustrated with motion pictures furnished schools and other organizations.

2. A quarterly magazine entitled California Fish and Game sent to all libraries and educational institutions and to numerous subscribers in addition. This magazine is widely used by biology and nature study classes.

3. A series of teachers' bulletins giving helpful material for use in the school is being prepared and issued.

4. A summer resort educational program in Yosemite National Park teaches more than 50,000 persons through lectures and nearly 10,000 in courses of field study the importance of conservation. A School of Field National History established in Yosemite National Park trains students who will be available to help in enlarging the nature education program.

5. Continual aid given boy scouts, camp fire girls, and girl scout organizations.

6. Continual effort made to encourage the teaching of nature study and conservation in the public schools. Loans of lantern slides, films and specimens are made.

7. Dependable answers furnished to numerous questions relative to the life history and habits of fish and game.

8. Investigations relative to the life history, habits and diseases of various game species prosecuted.

REPORT OF THE BUREAU OF PUBLICITY.

By Rolin G. Watkins, In Charge.

The present director of this bureau took over his duties on February 12, 1926. At that time there was turned over to him by Dr. H. C. Bryant, who formerly had charge of the publicity of the Commission in addition to his educational and research duties, about two hundred names of publications which had been supplied with material relative to the activities of the Fish and Game Commission. The majority of these were California publications, but many of them were published elsewhere throughout the nation. With the institution of a separate bureau, greater opportunity was afforded to acquaint the people of California with the work and aim of the Commission. The director at once set about building up a larger list of California newspapers, many of which were supplied from his own memory, but the majority were called to his attention through our clipping files as papers not supplied with our matter, but which were enough interested in wild life conservation to originate their own material. This list has now grown to more than six hundred California publications, besides many periodicals given over to matter of this sort issued elsewhere.

The present activities of this bureau may be enumerated as follows:

1. Supplying between six hundred and seven hundred newspapers and periodicals with from three to seven stories weekly. These stories are all straight news matter, experience having taught the director that propaganda, of any sort, will react upon the bureau furnishing same, as news editors will, once having been afflicted in this manner, refuse to use further material, regardless of its merit, originating from the same source.

2. Supplying photographs and special stories to such magazines as require them, after once the subject has been broached in general form to our entire newspaper list.

3. Special attention to the publicizing of the activities of the California State Game Farm, at Yountville.

4. Preparation of material to be used in radio addresses by the executive officer and others.

5. The securing of motion picture films of Commission activities, to be used by the Bureau of Education. These are secured without cost to the Commission through arrangement with pictorial news weeklies.

6. Assisting the executive officer by giving lectures before service clubs.

7. Checking, crediting and filing of all the clippings relative to wild life conservation and the activities of the Commission coming to the bureau through Allen's Press Clipping Service. A full and complete record is kept for each month, showing the number of clippings used by each publication on the list, and whether our own material originated in regular news channels, or by special writers. These clippings are furnished the heads of departments and bureaus interested in same for their perusal, and return to the general files.

8. The collection of data for editing and publication of "The Service Bulletin," the monthly publication for the Commission employees.

The director of this bureau is likewise the director of the Bureau of River and Harbor Pollution and gives much of his time to those activities. His work of publicity is done with the assistance of one girl from the executive department.

REPORT OF THE BUREAU OF GAME FARMS.

By August Bade, In Charge.

On December 7, 1925, the first work of construction was started on the site near Yountville that had been chosen as the location of the new game farm. This preliminary work consisted of grubbing out some fifty odd trees and filling up a large ditch that ran through the grounds. With the completion of this work, excavation was begun on the trench for the concrete base upon which the outer wall of the main enclosure was to be built. This necessitated the digging of a trench two feet deep for a distance of 2280 feet. The purpose of this concrete base is to exclude all ground vermin from the main rearing field. It required the services of a power concrete mixer and twelve men to lay this wall in seven days.

While this was being done a man and team were engaged in plowing the ditches in which over 7000 feet of water pipe was later to be laid forming the irrigation system for the 472 pens that the main enclosure was to contain.

Shortly after the first of the year twenty-four pens were built to care for the breeding stock that had been purchased in Oregon. These birds, ring-necked pheasants, arrived on the farm the 12th of January. Later on twenty-four more pens were built to accommodate all the pheasants and some valley quail that had been trapped for breeding purposes. There was not time for cultivation and the proper seeding of these breeding pens, so oak boughs were used as cover during the season. At intervals these boughs were renewed as the hot sun soon dried the leaves.

With the breeding stock taken care of, attention was directed towards the building of the rearing field. It was obvious that no time could be lost as the pheasants would start laying by the first of April. All material had been ordered, but it was a case of getting delivery. The first of seven cars of lumber arrived at the Yountville depot of the Southern Pacific on January 8th. A large truck belonging to the Fish and Game Commission was used in hauling this lumber to the site of the farm, a distance of four miles. It was soon worked into the framework of the structure by a crew of twenty-five carpenters and their helpers.

When it came to the matter of poultry netting, it was found necessary to have this article shipped direct from the factory at Boston, Massachusetts. Fifteen acres of wire netting was the order. The side walls of the pens are made of one-inch mesh wire and the top covering is two-inch. This order of wire came by water on one of the Luckenbach steamships.

While the framework was being put up, an expert plumber and his helpers were engaged in laying the water lines. The pipe for this system ranges in size from 4- to $\frac{3}{4}$-inch galvanized. Rector Creek furnishes the water and it is delivered into each pen under a seventy-pound pressure gravity feed.

It was now evident to all concerned that a race against time was on. The pheasants should start laying by the first of April. Could the construction work be finished? Running true to form, even under the handicap of noise and confusion, the first pheasant eggs were picked

up from the breeding pens on March 27th. In less than a month these eggs would hatch. They were held as long as possible before being set in order that a few more days might be had in which to have a few pens ready for the young birds.

On May 1st, the first brood of pheasants hatched and twenty-four pens were finished. The race had been won and the game farm was a reality. From now on, it was a mere matter of finishing more pens and hatching more birds and the pheasant hens were laying quite normally. But at this time, a new problem presented itself. In this particular locality there was a scarcity of Rhode Island and Buff hens, the kind that all game farms bank on for bird production. The writer well remembers driving over one hundred miles in quest of this particular fowl and coming back with no hens and only a few promises for the future.

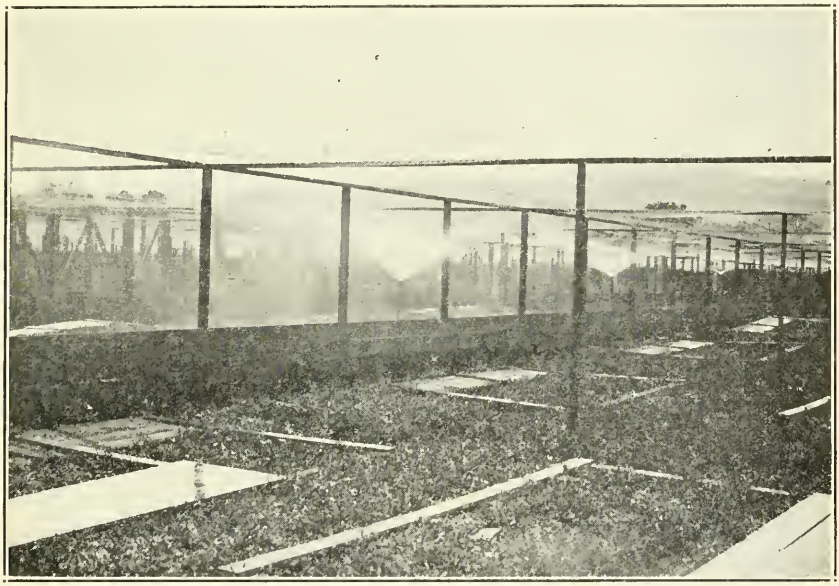


FIG. 16. Rearing pens at the State Game Farm at Yountville, showing the sprinkler system which helps provide green food and cover in half of each pen. Photograph by H. C. Bryant.

The local newspapers and all organizations that could be enlisted were asked to help. The response was good and in a short time it was possible to set the eggs quite readily. In order to further help this condition, incubators were used. Twenty-five hens would be set and at the same time an incubator with 300 eggs would be started. Naturally they would hatch at the same time and the incubator chicks would be given to the hens for brooding and rearing.

As the eggs began to hatch, it was discovered that the fertility was below normal. This was no doubt due to the noise and confusion and the lack of sufficient cover in the breeding pens.

A cross-section of the report for the week of June 25th showed that a total of 7639 pheasant eggs had been laid, 2821 birds had been hatched, and there were still incubating on that date, 2354 eggs. Up

to this time we had purchased for setting purposes, 408 domestic hens. Most of these hens will be kept over for duty next year.

The report of the same date shows 241 quail eggs laid, 149 birds hatched, and 48 eggs still incubating. The quail had suffered more from the noise than had the pheasants.

The buildings for the attendants at the farm were completed and occupied on June 15th.

During this construction period, the following buildings and pens were completed: Main rearing field consisting of 472 pens of the regulation size of 24 feet square; a breeding section of 48 pens; one domestic poultry house large enough to house 400 hens; one three-room sleeping compartment for men; one four-room cookhouse and mess hall; one storage room and cooking room with facilities for cooking pheasant food; one 3000-gallon tank and tower for domestic water and one 5-room cottage with basement.

Game bird farming is not so very different from any other farming line, only in the product and the equipment used. The work is so well standardized that with the usual amount of care and attention, a well-equipped farm will produce about the same amount of birds in one place as well as in another.

REPORT OF THE BUREAU OF RIVER AND HARBOR POLLUTION.

By Rolin G. Watkins, In Charge.

Appended hereto is a résumé of cases handled by this bureau to date. In this connection it should be noted that, despite the fact that much work has been done on pollution problems by various agencies of the Commission in the past, up to the time of the organization of this bureau on February 1, 1926, there had been no effort to centralize this work with a view to placing the enforcement of *all* the laws relating to pollution of California waters by "materials deleterious to fish,

Fig. 17. In order to determine whether pollution is sufficient to kill fish, a live car is often used. In a test made on Dominguez Slough, Long Beach, the fish shown in the picture were killed inside of ten minutes. Photograph by W. L. Woodruff.

plant or bird life," under one head. The information gathered in the past was in the files of other departments and bureaus, and it was neeessary to almost completely pioneer the field of pollution in the establishment of the new bureau. At present it ean be said to be "merely scraping the surface." New cases are appearing daily, partieularly eases of pollution by oil from oil fields. (Note—Long Beach ease is an example of this sort. Serious eondition exists there.) It is impossible to investigate all the eases reported to this bureau at once, and we are taking them in the order of their seeming import.

The work of this bureau was handled by the direetor, in conjunetion with his duties as direetor of publieity, until April 1. On this date Robt. J. Irvine, a eompetent chemist and baeteriologist, was added to

the staff. This man will, in future, conduct all routine investigations and handle the laboratory work for the bureau. In addition it is contemplated that his services will be required by the Patrol Department at times to assist in making scientific investigations as to diseases of fish and game and possibly in determining the nature of certain evidences submitted in court cases by the Patrol Service. The larger cases of this bureau, requiring an opinion or ruling on the scene of the pollution, must continue to be handled by the director.

So far this bureau has acted on the assumption that it is best to clean up a condition through seeking the cooperation of those in authority, and we have been forced to file but two suits in court. This condition may, or may not, continue to prevail. In short, it may be but a brief space of time until this bureau may find that particular situation requiring prompt court action, in which event we shall not hesitate. One lesson we have learned: When those in authority at the source of the pollution appear unwilling or unable to get action on conditions complained of, we go to the highest available authorities of the concern, where we usually get the finest cooperation. We are working in conjunction with the Bureau of Sanitary Engineering, State Board of Health, which body has, to date, given splendid cooperation.

The following cases are cited as a cross-section of the work done by this bureau in the first five months of its existence:

Pollution Report to July 1, 1926.

1. Inspection trips.

   A. Oil refineries.

      a. Associated Oil Company. April 7, 1926. Satisfactory.
      b. Shell Oil Company. May 22, 1926. Satisfactory.
      c. Standard Oil Company. May 21, 1926. Satisfactory.

2. Pollution reported and investigated.

   A. Distilleries.

      a. Mason By-Products Company. One fine of $200 in justice court of Sausalito. Numerous attempts to get additional evidence, but not successful as yet.

   B. Gas plants.

      a. Coast Counties Gas and Electric Company, Watsonville. May 28, 1926. Conditions much improved. Complete cleanup when new city sewer is in operation this fall.
      b. Coast Valleys Gas and Electric Company, Monterey. May 10, May 11, May 26, May 27, 1926. Now operating nicely.
      c. Pacific Gas and Electric Company, San Rafael. Extensive improvements being made which will undoubtedly eliminate pollution.
      d. Ukiah. City-owned plant. April 30, 1926. Satisfactory method of handling waste water worked out.

   C. Lumber mills.

      a. Albion Lumber Company, Albion. June 11, 1926. Referred to Screens and Ladders Bureau.
      b. Caspar Lumber Company, Caspar. June 10, 1926. Has cleaned up worst of pollution, but is still under investigation.
      c. Finkbine-Guild Lumber Company, Rockport. June 10, 1926. Referred to Screens and Ladders Bureau.
      d. Greenwood Lumber Company, Greenwood. June 11, 1926. Referred to Screens and Ladders Bureau.
      e. Melville and Sarness Lumber Company, Rockport. June 10, 1926. Satisfactory settlement.

f. Mill Creek Lumber Company, Monterey County. May 27, 1926. In excellent condition.
g. Union Lumber Company, 10-Mile River, Fort Bragg. June 11, 1926. Referred to Screens and Ladders Bureau.

D. Mines.

a. Cloverdale, Sulfur Creek. Mines shut down, but may reopen. Case being watched by Deputy Groves.
b. Westpoint. Shut down; little chance of reopening.

E. Oil.

a. Steamship *Castletown*, Hanlon Ship Yards, Oakland. June 16, 1926. Ship left harbor before court action could be taken. Owners warned.
b. Garages, Napa. April 6, 1926. No action yet.
c. San Luis Obispo (Pismo Beach), Union Oil Company. Fire April 15, 1926. Act of Providence. No action.
d. Santa Fe Yards, Richmond. June 7, 1926. No action yet.
e. Sausalito. April 30, 1926. Reported too late for us to take action.
f. Shell Oil Company Barge *City of Martinez*. May 19, 1926. Act of Providence. No action.
g. Shell Oil Company Steamship *Los Angeles*. Accident. No action.
h. Tiburon, Northwestern Pacific Railroad roundhouse. April 16, 1926. Cleaned up.
i. Union Oil Company, Oleum. Final cleanup started May 14, 1926.
j. Ventura County Oil Fields. (Producing) May 6, 1926. Much improved, but not entirely satisfactory yet.
k. Southern Pacific Company, Yreka. It has been reported that this has been handled satisfactorily.

F. Slaughter houses.

a. Peterson Bros. Inc., Watsonville. Promised to have everything in best shape by November 1, 1926. Making extensive improvements to the whole plant.
b. City Hall Market, Watsonville. May 28, 1926. Now in good shape.
c. San Francisco. International Fish Company, Noyo River. June 10, 1926. Referred to State Bureau of Sanitary Engineering.
d. Columbia and Northern Fishing and Packing Company, Noyo River. June 10, 1926. Referred to State Bureau of Sanitary Engineering.

G. Tanneries.

a. Kullman-Salz Company, Benicia. April 7, 1926. No action.
b. Sawyer Tanning Company, Napa. April 6, 1926. No action.

H. Miscellaneous.

a. Brookdale Lodge. May 26, 1926. Copper sulphate in swimming pool water. This water used by State Fish Hatchery. Cooperation with State Bureau of Sanitary Engineering resulted in amicable settlement of trouble.
b. Cunningham-Thomas Company, Ukiah. April 30, 1926. Lime-sulphur spray dumped into stream. Promised to prevent in the future.
c. Selby Smelting and Lead Company. April 5, 1926. No action; doubtful pollution.
d. Sonoma Valley Hot Springs. May 1, 1926. No action; doubtful pollution.

3. Reported pollution, but not yet investigated.

A. Lumber mills.

a. Little Butte Creek. Deputy to investigate and report.
b. Monterey Bay Lumber Company. This bureau will investigate.

B. Oil.

a. Long Beach. City thinks they can handle matter.

C. Paper mills.

a. Floriston. Will be investigated very soon.

D. Gas plants.

a. Pacific Gas and Electric Company, Sacramento. Will be investigated soon.

E. Mines.

a. La Grange Dredging Company. Will be investigated soon.
b. California Zinc Company, Redding. Will be investigated soon.

F. Miscellaneous.

a. Creamery at Crescent City. Will be investigated soon.
b. Stevenson Creek, Southern California Edison Company, Big Creek Project. Will be investigated soon.

FIG. 18. Securing water sample for chemical test to determine pollution at a sump in Long Beach. Photograph by W. L. Woodruff.

REPORT OF THE BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, In Charge.

With the reorganization of the Commission in January, 1926, changes in department administration were effected. As the head office was to be located at San Francisco it was imperative that the license department and accounting department remain at Sacramento, owing to the constant and close business relations with other departments at the State Capitol. Accordingly, a Bureau of Finance and Accounts which included all of the accounting and license distribution and sales of the Commission was created, and H. R. Dunbar, who had been connected with the Commission since 1912 and cashier since November, 1922, placed in charge.

The personnel of the Bureau of Finance and Accounts at the time of its creation was as follows: H. R. Dunbar, cashier and in charge; G. B. Gifford, bookkeeper; Mrs. Othella Coleman, clerk; Miss Eva Pearson, typist-clerk; Mr. L. E. Rust, chief license clerk; Miss Faye Graves, stenographer; Miss Thelma Brietzke, stenographer; J. J. Shannon, license clerk at San Francisco, and Miss S. D. Nash, license clerk at Los Angeles.

On March 26, 1926, Mr. Gifford asked for and was granted a leave of absence and A. A. Manship, who was in the accounting office of the Department of Agriculture, was secured to fill the position.

Immediately after the new bureau was created, the executive officer arranged with the Board of Control to have a thorough audit and examination made of the Commission's accounts and license records. Accordingly, R. R. Soberanes, an accountant of their department, was assigned to make the audit. Mr. Soberanes made a very thorough and exhaustive audit and examination of all the Commission's financial records at Sacramento, San Francisco, Los Angeles and San Pedro. In addition to this Mr. Soberanes revised the system of accounting, thereby eliminating certain unnecessary details, and at all times has been very helpful and congenial.

One of the first steps taken by the new executive officer was the preparation of a budget to cover the expenditures of the Commission for the balance of the seventy-seventh fiscal year. In order to accomplish this the various department and bureau heads were requested to make up budgets for their respective departments. This was immediately done and the full budget was then made up and presented to the Board of Control for their approval.

The work of the Bureau of Finance and Accounts is divided into two functions as follows: In the accounting office all traveling expenses of the employees of the Commission and all of their expense bills pertaining to operation and maintenance of the Commission are thoroughly audited and presented to the Board of Control and Controller's office for their audit and payment. All records and data pertaining to the expenditures of the Commission are kept in this office, being under the direction of the accountant.

The other function of this bureau concerns licenses and revenue. All details pertaining to the printing of licenses and the distribution of the

same to the branch offices and various county clerks throughout the state and the collection of all revenue derived from the sale of licenses or from all other sources is done through this office. At the end of each license year, final settlement must be made with the State Controller equal to the value of licenses originally charged. This part of the work is handled under the direction of the cashier. The total value of licenses that the cashier is accountable for to the State Controller at any one time is about $800,000.

In the appendix of the biennial report are shown statements of the expenditures and income of the Commission for the past two years as well as statements showing the sales of the various kinds of licenses.

In addition, the cashier pays through the revolving fund the expense claims of all employees of the Commission immediately after being audited in the accounting office and the revolving fund is reimbursed when the claims have been passed and paid by the State Controller's office. In this way the employees are paid their expenses at least two weeks earlier.

APPENDIX.

STATISTICAL REPORTS.

HUNTING LICENSE SALES—YEAR 1924-1925

Counties	Total sales	Citizen	Non-resident	Alien	Declarant alien
Alameda	$12,928 00	$12,313 00		$225 00	$390 00
Alpine	49 00	29 00	$20 00		
Amador	818 00	788 00	20 00		10 00
Butte	4,688 00	4,638 00			50 00
Calaveras	682 00	682 00			
Colusa	2,194 00	2,154 00	10 00		30 00
Contra Costa	3,201 00	3,036 00		75 00	90 00
Del Norte	968 00	813 00	100 00	25 00	30 00
El Dorado	1,419 00	1,364 00	20 00	25 00	10 00
Fresno	9,345 00	9,160 00	10 00	75 00	100 00
Glenn	1,464 00	1,434 00	10 00		20 00
Humboldt	5,475 00	5,195 00	10 00	100 00	170 00
Imperial	1,445 00	1,420 00		25 00	
Inyo	1,367 00	1,332 00		25 00	10 00
Kern	5,678 00	5,578 00		50 00	50 00
Kings	1,310 00	1,310 00			
Lake	1,603 00	1,583 00	10 00		10 00
Lassen	2,041 00	1,981 00	30 00		30 00
Los Angeles	44,492 00	44,017 00	170 00	175 00	130 00
Madera	1,177 00	1,157 00			20 00
Marin	2,102 00	2,102 00			
Mariposa	168 00	168 00			
Mendocino	3,722 00	3,452 00	10 00		260 00
Merced	2,012 00	2,002 00			10 00
Modoc	3,315 00	1,275 00	2,040 00		
Mono	174 00	154 00	20 00		
Monterey	3,057 00	2,947 00		100 00	10 00
Napa	2,682 00	2,367 00	10 00	75 00	230 00
Nevada	1,126 00	1,051 00	20 00	25 00	30 00
Orange	4,271 00	4,261 00			10 00
Placer	2,758 00	2,448 00		50 00	260 00
Plumas	1,222 00	1,202 00			20 00
Riverside	3,449 00	3,439 00			10 00
Sacramento	9,042 00	8,447 00	60 00	325 00	210 00
San Benito	1,098 00	1,003 00		25 00	70 00
San Bernardino	5,127 00	5,067 00		50 00	10 00
San Diego	8,929 00	8,819 00	20 00	50 00	40 00
San Francisco	19,387 00	14,972 00	70 00	1,825 00	2,520 00
San Joaquin	5,537 00	5,307 00		100 00	130 00
San Luis Obispo	2,688 00	2,573 00		75 00	40 00
San Mateo	2,529 00	2,109 00	20 00	100 00	300 00
Santa Barbara	3,165 00	2,985 00		100 00	80 00
Santa Clara	6,858 00	6,658 00	30 00	50 00	120 00
Santa Cruz	2,900 00	2,520 00		100 00	280 00
Shasta	2,624 00	2,514 00	30 00		80 00
Sierra	303 00	258 00	20 00	25 00	
Siskiyou	7,070 00	4,255 00	2,230 00	125 00	460 00
Solano	3,115 00	2,940 00	100 00	75 00	
Sonoma	7,843 00	7,223 00		200 00	420 00
Stanislaus	3,476 00	3,376 00			100 00
Sutter	906 00	881 00		25 00	
Tehama	1,437 00	1,417 00	20 00		
Trinity	979 00	969 00			10 00
Tulare	4,872 00	4,777 00	10 00	75 00	10 00
Tuolumne	1,344 00	1,279 00		25 00	40 00
Ventura	3,041 00	2,906 00		125 00	10 00
Yolo	2,460 00	2,320 00		50 00	90 00
Yuba	2,177 00	2,072 00		75 00	30 00
Oregon (state of)	4,142 00	102 00	4,040 00		
Nevada (state of)	140 00		140 00		
Total sales	$245,591 00	$224,601 00	$9,300 00	$4,650 00	$7,040 00
Total number of licenses	226,421	224,601	930	186	704

HUNTING LICENSE SALES—YEAR 1925-1926.

Counties	Total sales	Citizen	Non-resident	Alien	Declarant alien
Alameda	$13,304 00	$12,459 00		$275 00	$570 00
Alpine	88 00	48 00	$40 00		
Amador	904 00	824 00		50 00	30 00
Butte	5,094 00	5,034 00			60 00
Calaveras	979 00	979 00			
Colusa	2,284 00	2,239 00		25 00	20 00
Contra Costa	3,236 00	3,076 00		100 00	60 00
Del Norte	940 00	825 00	70 00	25 00	20 00
El Dorado	1,524 00	1,484 00	30 00		10 00
Fresno	9,554 00	9,234 00	40 00	150 00	130 00
Glenn	1,621 00	1,591 00	30 00		
Humboldt	5,169 00	4,964 00	20 00	75 00	110 00
Imperial	1,754 00	1,694 00		50 00	10 00
Inyo	1,607 00	1,572 00	10 00	25 00	
Kern	6,490 00	6,405 00		25 00	60 00
Kings	1,298 00	1,278 00			20 00
Lake	1,977 00	1,977 00			
Lassen	2,439 00	2,269 00	70 00		100 00
Los Angeles	42,852 00	42,187 00	100 00	275 00	290 00
Madera	1,459 00	1,419 00			40 00
Marin	2,011 00	2,011 00			
Mariposa	226 00	226 00			
Mendocino	3,571 00	3,456 00		25 00	90 00
Merced	2,421 00	2,401 00			20 00
Modoc	2,389 00	1,239 00	1,150 00		
Mono	274 00	234 00	40 00		
Monterey	3,291 00	3,106 00		75 00	110 00
Napa	2,680 00	2,410 00		50 00	220 00
Nevada	1,119 00	1,044 00	30 00	25 00	20 00
Orange	4,040 00	4,030 00			10 00
Placer	3,243 00	2,858 00	40 00	75 00	270 00
Plumas	1,642 00	1,592 00	30 00		20 00
Riverside	4,633 00	4,613 00			20 00
Sacramento	8,455 00	7,775 00	50 00	400 00	230 00
San Benito	1,166 00	1,101 00		25 00	40 00
San Bernardino	4,756 00	4,746 00			10 00
San Diego	8,513 00	8,343 00	40 00	100 00	30 00
San Francisco	18,009 00	14,449 00	180 00	1,450 00	1,930 00
San Joaquin	6,287 00	6,002 00		125 00	160 00
San Luis Obispo	2,996 00	2,846 00		100 00	50 00
San Mateo	2,896 00	2,121 00		425 00	350 00
Santa Barbara	3,787 00	3,582 00		125 00	80 00
Santa Clara	7,017 00	6,757 00		150 00	110 00
Santa Cruz	2,985 00	2,640 00		75 00	270 00
Shasta	2,665 00	2,585 00	10 00		70 00
Sierra	337 00	312 00		25 00	
Siskiyou	9,256 00	4,806 00	3,770 00	150 00	530 00
Solano	2,946 00	2,796 00		50 00	100 00
Sonoma	7,539 00	6,874 00	10 00	175 00	480 00
Stanislaus	3,739 00	3,589 00			150 00
Sutter	947 00	947 00			
Tehama	1,938 00	1,893 00		25 00	20 00
Trinity	860 00	860 00			
Tulare	4,988 00	4,908 00		50 00	30 00
Tuolumne	1,108 00	1,088 00			20 00
Ventura	2,977 30	2,822 30	10 00	125 00	20 00
Yolo	2,430 00	2,295 00		25 00	110 00
Yuba	2,089 00	2,069 00			20 00
Oregon (state of)	4,632 00	282 00	4,350 00		
Nevada (state of)	520 00		520 00		
Total sales	$251,951 30	$229,266 30	$10,640 00	$4,925 00	$7,120 00
Total number of licenses	231,239	229,266	1,064	197	712

ANGLING LICENSE SALES—YEAR 1924.

Counties	Total sales	Citizen	Non-resident	Alien
Alameda	$11,391 00	$11,010 00	$6 00	$375 00
Alpine	382 00	106 00	264 00	12 00
Amador	737 00	710 00	24 00	3 00
Butte	4,791 00	4,626 00	30 00	135 00
Calaveras	909 00	885 00		24 00
Colusa	749 00	728 00		21 00
Contra Costa	2,376 00	2,316 00		60 00
Del Norte	969 00	867 00	57 00	45 00
El Dorado	2,092 00	1,992 00	33 00	67 00
Fresno	8,571 00	8,145 00	9 00	417 00
Glenn	689 00	686 00	3 00	
Humboldt	6,626 00	6,404 00	15 00	207 00
Imperial	303 00	303 00		
Inyo	3,870 00	3,735 00	54 00	81 00
Kern	2,253 00	2,232 00	6 00	15 00
Kings	596 00	542 00		54 00
Lake	1,111 00	1,096 00	3 00	12 00
Lassen	1,865 00	1,754 00	30 00	81 00
Los Angeles	37,166 00	36,653 00	159 00	354 00
Madera	1,140 00	1,119 00	3 00	18 00
Marin	1,413 00	1,413 00		
Mariposa	1,485 00	1,404 00	60 00	21 00
Mendocino	2,928 00	2,841 00	9 00	78 00
Merced	1,269 00	1,239 00	9 00	21 00
Modoc	994 00	955 00	33 00	6 00
Mono	845 00	458 00	282 00	105 00
Monterey	1,365 00	1,293 00	12 00	60 00
Napa	1,753 00	1,714 00	3 00	36 00
Nevada	2,260 00	2,068 00	84 00	108 00
Orange	2,460 00	2,448 00		12 00
Placer	2,980 00	2,780 00	33 00	167 00
Plumas	2,475 00	2,301 00	63 00	111 00
Riverside	1,868 00	1,823 00		45 00
Sacramento	11,306 00	8,426 00	36 00	2,844 00
San Benito	234 00	234 00		
San Bernardino	8,971 00	8,896 00	18 00	57 00
San Diego	5,891 00	5,840 00	12 00	39 00
San Francisco	16,940 00	15,536 00	48 00	1,356 00
San Joaquin	7,660 00	6,730 00		930 00
San Luis Obispo	659 00	638 00	6 00	15 00
San Mateo	889 00	889 00		
Santa Barbara	2,635 00	2,584 00		51 00
Santa Clara	3,967 00	3,916 00		51 00
Santa Cruz	2,484 00	2,346 00		138 00
Shasta	3,003 00	2,922 00	6 00	75 00
Sierra	644 00	593 00	30 00	21 00
Siskiyou	6,056 00	5,483 00	303 00	270 00
Solano	2,570 00	2,204 00		366 00
Sonoma	5,588 00	5,426 00	9 00	153 00
Stanislaus	4,996 00	4,867 00	6 00	123 00
Sutter	541 00	517 00		24 00
Tehama	1,446 00	1,431 00	6 00	9 00
Trinity	661 00	649 00		12 00
Tulare	4,059 00	3,927 00	18 00	114 00
Tuolumne	1,391 00	1,355 00	6 00	30 00
Ventura	2,264 00	2,180 00	3 00	81 00
Yolo	807 00	777 00		30 00
Yuba	1,583 00	1,529 00		54 00
Reno, Nevada	1,062 00		1,062 00	
Total sales	$210,988 00	$198,541 00	$2,853 00	$9,594 00
Total number of licenses	202,690	198,541	951	3,198

ANGLING LICENSE SALES—YEAR 1925.

Counties	Total sales	Citizen	Non-resident	Alien
Alameda	$13,690 00	$13,234 00	$12 00	$444 00
Alpine	414 00	120 00	294 00	
Amador	792 00	774 00	3 00	15 00
Butte	4,684 00	4,525 00	21 00	138 00
Calaveras	948 00	933 00	12 00	3 00
Colusa	794 00	761 00	9 00	24 00
Contra Costa	2,652 00	2,565 00		87 00
Del Norte	1,111 00	1,012 00	72 00	27 00
El Dorado	1,899 00	1,788 00	18 00	93 00
Fresno	10,484 00	9,905 00	18 00	561 00
Glenn	663 00	657 00	3 00	3 00
Humboldt	5,824 00	5,638 00	15 00	171 00
Imperial	492 00	480 00	3 00	9 00
Inyo	4,631 00	4,427 00	96 00	108 00
Kern	3,211 00	3,181 00	6 00	24 00
Kings	776 00	764 00		12 00
Lake	1,173 00	1,170 00		3 00
Lassen	2,430 00	2,352 00	24 00	54 00
Los Angeles	39,561 00	38,961 00	147 00	453 00
Madera	1,727 00	1,700 00	3 00	24 00
Marin	1,713 00	1,686 00		27 00
Mariposa	1,411 00	1,387 00	12 00	12 00
Mendocino	2,782 00	2,698 00	6 00	78 00
Merced	1,582 00	1,567 00		15 00
Modoc	896 00	845 00	30 00	21 00
Mono	925 00	547 00	345 00	33 00
Monterey	1,927 00	1,873 00		54 00
Napa	2,211 00	2,160 00	6 00	45 00
Nevada	2,045 00	1,820 00	69 00	156 00
Orange	2,719 00	2,689 00	3 00	27 00
Placer	3,277 00	2,995 00	54 00	228 00
Plumas	2,515 00	2,350 00	78 00	87 00
Riverside	2,447 00	2,387 00	3 00	57 00
Sacramento	12,529 00	9,655 00	24 00	2,850 00
San Benito	366 00	354 00	3 00	9 00
San Bernardino	8,017 00	7,921 00	15 00	81 00
San Diego	6,916 00	6,862 00	21 00	33 00
San Francisco	19,857 00	18,180 00	72 00	1,605 00
San Joaquin	7,071 00	6,333 00	6 00	732 00
San Luis Obispo	995 00	971 00		24 00
San Mateo	1,039 00	1,018 00		21 00
Santa Barbara	2,495 00	2,435 00		60 00
Santa Clara	5,487 00	5,415 00	9 00	63 00
Santa Cruz	2,858 00	2,732 00		126 00
Shasta	2,999 00	2,927 00	21 00	51 00
Sierra	679 00	640 00	18 00	21 00
Siskiyou	6,511 00	5,818 00	420 00	273 00
Solano	2,887 00	2,470 00		417 00
Sonoma	5,748 00	5,610 00	3 00	135 00
Stanislaus	3,976 00	3,916 00	3 00	57 00
Sutter	811 00	778 00	3 00	30 00
Tehama	1,683 00	1,653 00	9 00	21 00
Trinity	519 00	504 00	6 00	9 00
Tulare	5,324 00	5,153 00	60 00	111 00
Tuolumne	1,880 00	1,826 00	15 00	39 00
Ventura	2,569 00	2,500 00	30 00	39 00
Yolo	916 00	889 00		27 00
Yuba	1,840 00	1,705 00	6 00	129 00
Nevada (state of)	2,079 00		2,079 00	
Oregon (state of)	44 00	8 00	36 00	
Total sales	$232,501 00	$218,224 00	$4,221 00	$10,056 00
Total number of licenses	222,983	218,224	1,407	3,352

MARKET FISHERMEN'S LICENSE SALES.

Total sales, license year April 1, 1924, to March 31, 1925	$46,710 00
Total sales, license year April 1, 1925, to March 31, 1926	50,720 00

License fee: All persons, $10.

TRAPPING LICENSE SALES.

Total sales, license year July 1, 1924, to June 30, 1925	$2,984 00
Total sales, license year July 1, 1925, to June 30, 1926	3 598 00

License fee: Citizens, $1; aliens, $2.

FISH PACKERS' AND WHOLESALE SHELL-FISH DEALERS' LICENSE SALES.

Total sales, license year July 1, 1924, to June 30, 1925	$1,200 00
Total sales, license year July 1, 1925, to June 30, 1926	1,345 00

License fee: Citizens, $5; aliens, $20.

GAME BREEDERS' LICENSE SALES.

Total sales, license year January 1, 1924, to December 31, 1924	$240 00
Total sales, license year January 1, 1925, to December 31, 1925	320 00

License fee: All persons, $2.50.

FISH BREEDERS' LICENSE SALES.

Total sales, license year January 1, 1924, to December 31, 1924	$65 00
Total sales, license year January 1, 1925, to December 31, 1925	65 00

License fee: All persons, $5.

DOMESTICATED FISH IMPORTERS' LICENSE SALES.

Total sales, license year January 1, 1924, to December 31, 1924	None
Total sales, license year January 1, 1925, to December 31, 1925	None

License fee: All persons, $5.

KELP LICENSE SALES.

Total sales, year 1924	$10 00
Total sales, year 1925	20 00

License for term of one year from date of issue. Fee, $10.

VIOLATIONS OF FISH AND GAME LAWS.

GAME CASES.

	July 1, 1924, to June 30, 1925			July 1, 1925, to June 30, 1926		
	Number of arrests	Amount of fines and forfeitures imposed	Jail sentences imposed (days)	Number of arrests	Amount of fines and forfeitures imposed	Jail sentences imposed (days)
Violations Hunting License Act	137	$2,503 00	32	146	$2,255 00	10
Ducks—buy or sell; taking and possession closed season; over bag limit	30	565 00	10	48	1,320 00	152
Geese—taking and possession closed season; over bag limit	5	115 00	25	9	200 00	
Mudhens—taking and possession closed season	1	25 00		7	125 00	
Swans—taking and possession (no open season)	6	150 00		4	115 00	
Cranes—taking and possession (no open season)				2	50 00	
Shorebirds—taking and possession (no open season)	15	385 00		18	490 00	
Doves—taking and possession closed season; over bag limit	49	1 150 00	180	21	573 00	
Pigeons, wild—taking and possession (no open season)	13	275 00		6	175 00	30
Quail—taking and possession closed season; over bag limit	42	1,250 00	30	63	2,355 00	
Pheasants—illegal taking or possession	10	525 00		12	875 00	55
Sage hens—taking and possession closed season; over bag limit	9	175 00		1	25 00	
Non-game birds taking and possession	85	2,227 00		37	1,005 00	20
Deer—buy or sell; run with dogs; taking and possession, closed season; failure to retain horns and hide; over bag limit	84	5,140 00	715	118	6,965 00	515
Deer—taking and possession does, fawns, spiked bucks	61	4,470 00	50	45	2,450 00	360
Mountain sheep—taking and possession (no open season)	3	100 00				
Elk—taking and possession (no open season)	3	Pending				
Squirrels, tree—taking and possession (no open season)	8	250 00	30	10	420 00	
Rabbits, cottontail, brush—taking and possession closed season	26	585 00	30	52	1,475 00	30
Fur trapping regulations, violations of	5	90 00		12	190 00	
Beaver hides—illegal possession	2	125 00				
Trespass	11	230 00		10	310 00	
Shoot wild game from automobile, power or sail boat; illegal use of scull boat	3	150 00		29	536 00	2
Game refuge—hunting and possession of firearms	17	625 00		18	350 00	
Night hunting	79	2,035 00	375	60	1,150 00	
Total game cases	704	$23,145 00	1,477	728	$23 409 00	1,174

FISH CASES.

	July 1, 1924, to June 30, 1925			July 1, 1925, to June 30, 1926		
	Number of arrests	Amount of fines and forfeitures imposed	Jail sentences imposed (days)	Number of arrests	Amount of fines and forfeitures imposed	Jail sentences imposed (days)
Violations Angling License Act	66	$1,191 00	11	67	$1,430 00	50
Violations Commercial Fishing License Act	39	580 00		46	580 00	
Trout—taking and possession closed season; other than hook and line; over bag limit; offering for sale	79	1,910 00	25	82	2,625 00	50
Black bass—taking and possession closed season; over bag limit; undersized	7	85 00	40	8	195 00	
Sunfish, perch, crappie—taking and possession closed season	2	45 00		8	110 00	50
Night fishing, illegal	9	190 00	25	8	205 00	
Fishing—within 250 feet of fishway, within 150 feet of lower side of dam	21	450 00	40	18	320 00	540
Striped bass—closed season sale; undersized; over bag limit; shipment out of state	107	3,010 00		86	2,540 00	70
Shad—illegal possession and sale	2	40 00		3	60 00	
Salmon—closed season sale; over bag limit; illegal taking and possession	7	300 00		20	1,275 00	150
Catfish—sale of undersized	1	20 00				
Halibut—undersized	1	25 00		2	40 00	
Barracuda—undersized	8	200 00		6	220 00	
Spot-fin croaker, sale of	1	10 00		1	25 00	
Sturgeon—possession of				1	25 00	
Smelt—young of, possession				1	20 00	
Salt water perch—closed season sale				1	25 00	
Salt water eels—over bag limit; undersized	4	125 00		4	90 00	
Crabs—taking and possession closed season; females; undersized; transporting from District No. 1½	27	635 00	25	34	1,365 00	
Clams—taking and possession closed season; over bag limit; undersized	230	6,810 00	304	151	4 795 00	120
Abalones—taking and possession closed season; taking with diving apparatus; over bag limit; undersized	202	5,715 00	252	181	4,995 00	
Lobsters—taking and possession closed season; over bag limit; undersized	33	1,075 00		33	1,205 00	
Illegal fishing—fish reservation				4	170 00	
Illegal shipment—fish, shellfish	6	225 00	100			
Failure to keep commercial fishing data	1	100 00				
Water pollution; use of explosives to take fish				8	650 00	90
Obstructions in streams; failure to maintain fish screen	9	300 00		5	100 00	
Nets, traps, lines—illegal possession or use	43	3.435 00	500	92	8,360 00	
Total fish cases	905	$26.476 00	1,322	870	$31,425 00	1,120

RECAPITULATION.

	Number of arrests	Fines and forfeitures imposed	Jail sentences (days)
Fish cases, 1924-1925	905	$26,476 00	1,322
Game cases, 1924-1925	704	23,145 00	1,477
Totals, 1924-1925	1,609	$49.621 00	2,799
Fish cases, 1925-1926	870	$31,425 00	1,120
Game cases, 1925-1926	728	23,409 00	1,174
Totals, 1925-1926	1,598	$54 834 00	2,294
Recapitulation—			
1924-1925	1,609	$49,621 00	2,799
1925-1926	1,598	54,834 00	2,294
Totals	3,207	$104,455 00	5,093

TOTAL ARRESTS FOR A PERIOD OF TWENTY-FOUR YEARS.

1902-1904	550
1904-1906	774
1906-1908	1,192
1908-1910	1,771
1910-1912	2,063
1912-1914	1,993
1914-1916	2,087
1916-1918	1,797
1918-1920	1,891
1920-1922	2,258
1922-1924	2,715
1924-1926	3,207

SEIZURES OF FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

	July 1, 1924, to June 30, 1925	July 1, 1925, to June 30, 1926	Total
Ducks	1,062	1,933	2,995
Geese	40	192	232
Mudhens	4	5	9
Swans	3	5	8
Cranes		1	1
Shorebirds	25	273	298
Doves	177	75	252
Wild pigeons	7	10	17
Quail	90	108	198
Pheasants	9	62	71
Sagehens	61	3	64
Non-game birds	25	56	81
Deer meat	1,596 pounds	3,956 pounds	5,192 pounds
Deer heads	4		4
Deer hides	4	11	15
Mountain sheep heads		1	1
Mountain sheep meat	12 pounds		12 pounds
Elk meat	40 pounds		40 pounds
Squirrels	7	17	24
Rabbits—cottontail brush	15	93	108
Bear meat		10 pounds	10 pounds
Beaver hides	11	1	12
Miscellaneous furs	3	14	17
Trout	924	1,284	2,108
Black bass	31	5	36
Crappie, perch, sunfish	39	65	104
Striped bass	19,811 pounds	2,929 pounds	22,770 pounds
Shad	5	340	345
Salmon	3,310 pounds	13 866 pounds	17,176 pounds
Catfish		204 pounds	204 pounds
Barracuda	3,930 pounds	15,002 pounds	18,932 pounds
Spot fin croaker	60 pounds	132 pounds	192 pounds
Sturgeon	156 pounds		156 pounds
Crabs	2,347	3,649	5,996
Crab meat		327 pounds	327 pounds
Clams	6,347	6,129	12,476
Abalones	3,223	1,158	4,381
Abalone meat		105 pounds	105 pounds
Lobsters	3,521 pounds	766 pounds	4,287 pounds
Miscellaneous fish	12 pounds	100 pounds	112 pounds
Nets	20	18	38
Crawfish traps	126		126

Illegally used fishing apparatus, after condemnation in superior courts, is destroyed or sold by the board in accordance with the law. All wholesome fish and game is donated to charitable and public institutions.

SUMMARY OF FISH DISTRIBUTION, SEASON 1924-1925.

Hatchery	Rainbow	Loch Leven	Steelhead	Eastern Brook	German Brown	Large Lake	Cutthroat
Bear Lake	1,640,000						
Brookdale	150,000		1,295,000				
Clear Creek	1,359,162						
Domingo Springs	1,844,722						
Fall Creek	888,000						
Feather River	1,322,200	255,000		201,300		109,400	
Fort Seward	3,783,620		1,582,700			108,920	160,000
Kaweah	235,000		200,000				
Mount Shasta	7,806,004	10,322,504	442,500	5,935,508	3,614,000	180,000	240,000
Mount Tallac	745,000		85,000			1 305,000	
Mount Whitney	3,556,000	659,000	1,047,000	663,000		110,000	
North Creek	1,600,000						
Rush Creek							
Tahoe	1,157,500					727,500	
Ukiah	346,365		835,400				
Wawona	337,500		439,300				
Totals	26,771,373	11,236,504	5,926,900	6,799,808	3,614,000	2,540,820	400,000

SUMMARY OF FISH DISTRIBUTION, SEASON 1924-1925—Continued.

Hatchery	Black Spotted	Mackinaw	Salmon	Golden	Crappie	Sunfish
Bear Lake						
Brookdale						
Clear Creek						
Domingo Springs						
Fall Creek			7,556,000			
Feather River	198,200					
Fort Seward	200,000		498,150			
Kaweah						
Mount Shasta	100,000	75,000	6,103,000			
Mount Tallac						
Mount Whitney	304,000			838,000		
North Creek						
Rush Creek	520,000					
Tahoe						
Ukiah						
Wawona						
Fish transplantation					60	35
Totals	1,322,200	75,000	14,157,150	838,000	60	35

RECAPITULATION, SEASON 1924-1925.

Trout	59,524,700
Salmon	14,157,150
Grand total	73,681,850

FISH DISTRIBUTION BY COUNTIES, SEASON 1925.

Mount Shasta Hatchery.

County	Rainbow	Loch Leven	Eastern Brook	German Brown	Cutthroat	Large Lake	Salmon	Brown Spotted
Alameda	45,000							
Alpine	15,000	25,000	25,000	104,000				
Amador	110,000	290,000	70,000	100,000				
Butte	224,000	301,000	186,000					
Calaveras	235,000	110,000	25,000	134,000				
Colusa	95,000	70,000	35,000					
Del Norte	45,000		75,000			90,000	40,000	
El Dorado	175,000	420,000	274,000	65,000				
Fresno	310,000	365,000	250,000	75,000				
Glenn	32,000	32,000	27,000					
Kern	225,000	175,000	100,000					
Lake	65,000	130,000		100,000				
Lassen	10,000		8,000					100,000
Madera	85,000	100,000	100,000	50,000				
Marin	20,000	75,000						
Mariposa	110,000	101,000	130,000	100,000				
Modoc	83,000	119,000	50,000					
Mono	60,000							
Monterey	425,000	80,000		25,000				
Napa	85,000	35,000		33,000				
Nevada	302,500	595,000	275,000	190,000				
Placer	192,000	202,000	195,000	5,000				
Plumas	86,000	159,000	106,000					
San Diego				200,000				
San Luis Obispo	60,000	135,000						
San Mateo	75,000		10,000	10,000				
Santa Barbara	30,000	30,000	20,000					
Santa Clara			7,500					
Santa Cruz	20,000		32,000					
Shasta	245,500	259,000	140,000	50,000				
Sierra	10,000	35,000	20,000					
Siskiyou	540,000	569,000	517,500	140,000	100,000		3,042,000	
Solano		100,000						
Sonoma		5,000						
Tehama	157,000	118,000	8,000	22,000				
Trinity	195,000	180,000	120,000					
Tuolumne	255,000	549,000	195,000	362,000				
Yolo				15,000				
Totals	4,622,000	5,355,000	3,001,000	1,780,000	100,000	90,000	3,082,000	100,000

Fall Creek Hatchery.

County	Rainbow	Salmon
Siskiyou	635,000	5,249,000

Mount Whitney Hatchery.

County	Rainbow	Loch Leven	Steelhead	Eastern Brook	Brown Spotted	Golden
Fresno	100,000		50,000			
Inyo	444,000	222,000	170,000	136,000	36,000	120,000
Los Angeles	286,500	12,500	30,000			
Mono	921,000	35,000	140,000	152,000	268,000	306,000
Riverside	157,000	10,000	15,000	51,000		
San Bernardino	70,000					
San Diego	117,500		120,000			
Tulare	446,000	25,000	20,000	10,000		
Ventura	147,500	7,500	180,000	2,000		
Totals	2,689,500	312,000	725,000	351,000	304,000	426,000

Rush Creek Hatchery.

County—	Black Spotted
Mono	520,000

Fort Seward Hatchery.

County	Rainbow	Steelhead	Black Spotted	Salmon	Cutthroat
Humboldt	2,246,260	943,610	200,000	249,780	10,000
Mendocino	540,000	265,000			
Trinity	100,000				
Totals	2,886,260	1,208,610	200,000	249,780	10,000

Ukiah Hatchery.

County	Rainbow	Steelhead
Lake	30,000	100,000
Mendocino	39,500	331,000
Sonoma	80,000	280,000
Totals	149,500	711,000

Tahoe Hatchery.

County	Rainbow	Large Lake
El Dorado	265,000	25,000
Nevada	65,000	
Placer	600,000	160,000
Sierra	40,000	20,000
Totals	970 000	205,000

Tallac Hatchery.

County	Rainbow	Steelhead	Large Lake
Alpine	45,000		20 000
El Dorado	700,000	85,000	295,000
Totals	745,000	85,000	315,000

Domingo Springs Hatchery

County—	Rainbow
Lassen	235,000
Plumas	270,627
Total	505,627

Clear Creek Hatchery

County—	Rainbow
Lassen	594,942
Plumas	78,000
Shasta	10,000
Total	682,942

Bear Lake Hatchery

County—	Rainbow
San Bernardino	1,040,000

North Creek Hatchery.

County—	Rainbow
San Bernardino	1,000,000

Brookdale Hatchery.

County	Rainbow	Steelhead
Santa Clara	75,000	75,000
Tulare		100,000
Santa Cruz	75,000	520,000
Totals	150,000	695,000

Feather River Hatchery.

County	Rainbow	Loch Leven	Eastern Brook	Black Spotted
Butte	14,000		6,000	
Plumas	406,400	130,000	126,300	128,200
Sierra	285,000	80,000	30,000	70,000
Yuba	56,000	45,000	39,000	
Totals	761,400	255,000	201,300	198,200

Wawona Hatchery.

County	Rainbow	Steelhead
Mariposa	238,000	239,000

Kaweah Hatchery.

County	Rainbow	Steelhead
Tulare	75,000	20,000

FISH DISTRIBUTION BY COUNTIES, SEASON 1924.

Mount Shasta Hatchery.

County	Rainbow	Loch Leven	Steelhead	Eastern Brook	German Brown	Cutthroat	Large Lake	Salmon	Mackinaw
Alpine	10,000	59,000	1,000		70,000				
Amador	70,000	220,000	30,000	75,000	175,000				
Butte	145,000	155,000	10,000	150,000					
Calaveras	140,000	206,000	6,000	38,000	200,000				
Colusa	55,000	60,000	25,000	30,000					
Del Norte	40,000			76,000			90,000	40,000	
El Dorado	150,000	470,000	50,000	235,000	8,000				
Fresno	250,000	445,000	20,000	286,500	150,000				
Kern	180,000	150,000		50,000					
Lake	35,000	100,000	15,000		100,000				75,000
Los Angeles					10,000				
Madera	65,000	125,000		110,000					
Marin	10,000	60,000	10,000						
Mariposa	86,000	180,000		100,000	54,000				
Modoc	43,000	100,500	2,500	82,500					
Mono	25,000	100,000	20,000	40,000					
Monterey	200,000								
Napa	30,000	115,000	70,000						
Nevada	250,000	665,000	75,000	463,500	260,000				
Placer	87 500	152,500	10,000	183,000					
Plumas	135,000	280,500		190,500					
San Benito	4	4		8					
San Diego					490,000				
San Mateo	15,000		30,000						
Santa Barbara	20,000	30,000	10,000	20,000					
Shasta	256,000	190,000	5,000	125,000	50,000				
Sierra		37,000		84,500					
Siskiyou	330,000	497,000	50,000	310,000	105,000	140,000		2,981,000	
Sonoma		4,000							
Tehama	127,000	50,000			12,000				
Trinity	195,000	50,000		15,000					
Tulare		100,000							
Tuolumne	209,500	341,000		270,000	150,000				
Yuba	25,000	25,000							
Totals	3,184,004	4,967,504	442,500	2,934,508	1,834,000	140,000	90,000	3,021,000	75,000

Fall Creek Hatchery.

County	Rainbow	Salmon
Siskiyou	253,000	2,307,000

Mount Whitney Hatchery.

County	Rainbow	Loch Leven	Steelhead	Eastern Brook	Golden	Large Lake
Fresno					332,000	
Inyo	213,000	92,000	32,000	71,000	12,000	30,000
Los Angeles	132,750		19,000			
Mono	161,000	150,000	20,000	201,000	68,000	80,000
Riverside	53,750	50,000	20,000	10,000		
San Diego	120,000	10,000	85,000			
Tulare	80,000	45,000	30,000	20,000		
Ventura	106,000		116,000	10,000		
Totals	866,500	347,000	322,000	312,000	412,000	110,000

Fort Seward Hatchery.

County	Rainbow	Steelhead	Large Lake	Cutthroat	Salmon
Humboldt	768,360	264,090	108,920	150,000	198,370
Mendocino	129,000	110,000			50,000
Totals	897,360	374,090	108,920	150,000	248,370

Ukiah Hatchery.

County	Rainbow	Steelhead
Lake	20,000	50,000
Mendocino	86,865	34,400
Sonoma	90,000	40,000
Totals	196,865	124,400

Tallac Hatchery.

County—	Large Lake
El Dorado	990,000

Tahoe Hatchery.

County	Rainbow	Large Lake
Alpine	20,000	
El Dorado	42,500	150,000
Nevada	25,000	37,500
Placer	100,000	310,000
Sierra		25,000
Totals	187,500	522,500

Domingo Springs Hatchery.

County—	Rainbow
Lassen	1,163,095
Plumas	176,000
Total	1,339,095

Clear Creek Hatchery.

County—	Rainbow
Lassen	56,000
Plumas	620,520
Total	676,520

Bear Lake Hatchery.

County—	Rainbow
San Bernardino	600,000

North Creek Station.

County—	Rainbow
San Bernardino	600,000

Brookdale Hatchery.

County—	Steelhead
San Mateo	50,000
Santa Clara	50,000
Santa Cruz	500,000
Totals	600,000

Feather River Hatchery.

County	Rainbow	Large Lake
Plumas	245,800	44,400
Shasta	20,000	
Sierra	295,000	65,000
Totals	560,800	109,400

Wawona Hatchery.

County	Rainbow	Steelhead
Mariposa	99,500	200,300

Kaweah Hatchery.

County	Rainbow	Steelhead
Tulare	160,000	180,000

Fish Transplantation

County	Crappie	Sunfish
Tuolumne	60	35

LION BOUNTIES.

Statement of lion bounties paid by the Fish and Game Commission.

County	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total
Alameda		1															1			2
Alpine									1									1	1	3
Amador		3		1	2	2										2			1	12
Butte	2	11	5	2	4	3	2	1			1		2			1			1	35
Calaveras		1	4	1		1		1	3				2		3		1	2	1	20
Colusa		3		3	3	1	1	2	1			3			1	2	1	2	2	25
Del Norte		10	12	4	11	11	23	4	2	9	4	2	5	1	3	4	2	8	6	121
El Dorado	2	7	2	1	8	9	6	1		2	1	1	8	6	14	7	3	3	4	85
Fresno		1	3	1		4		1	1	1	4	3	4	2	6	2	3	10	2	48
Glenn		13	6	6	1	4	5	1			1	3	3	3	3	10	1	4	1	65
Humboldt	10	113	67	71	42	50	41	46	26	39	29	22	8	19	16	14	10	11	13	647
Imperial									1					1						2
Inyo						1		1	3	1			1		1		4	4		16
Kern		8	10	12	5	9	10	5	15	18	17	10	15	12	8	17	22	21	14	228
Kings											1									1
Lake	2	14	11	13	9	10	7	5	8	2	5	11	9	11	10	21	21	12	17	198
Lassen			1		2	1	2						1		2					9
Los Angeles		7	1	2	2		2	5	5	1	7	8	9	12	7	5	3	4	3	83
Madera		3	5	1		1	1	9	10	1	2	5	1	1			1	2	2	45
Mariposa	2	4	3	6	2	1	4	9	2	14	13	12	5	4	6	7	5			99
Mendocino	5	44	18	11	16	17	24	15	7	7	15	18	22	13	15	22	9	15	30	323
Merced				1										1	1				1	4
Modoc			1	1	1							1						1		5
Mono								2		5				1	2	1		1	2	14
Monterey		14	11	7	1	3	9	3	8	6	12	12	19	12	7	16	17	30	23	210
Napa				1		2														3
Nevada		1	1	1						2		2						1		8
Orange			1	1	1		1				2	2	1							9
Placer		5	4	1	2	7	3	3	1	4	2	2	3	9	13		5			64
Plumas		2		3		1	2				1					1				10
Riverside		2	5			4	2			3	4	4	5	6	8		2	2	3	50
Sacramento													1							1
San Benito		1	2	1	2	11	3	2	2	5	1	2	1	2	2	2	3	2	1	45
San Bernardino		5	2	1	2		2	1	1		1	5	3	6	2	4	3	4	10	52
San Diego		3	5	5	8	3	1	2	1	1	3	4	5	4	2		1	5	5	58
San Joaquin									2											2
San Luis Obispo		11	5	9	4	4	5	7	10	3	9	3	6	9	12	13	10	8	5	133
San Mateo				1																1
Santa Barbara		7	24	7	3	5	11	4	4	6	3	6	19	5	15	26	13	11	5	174
Santa Clara			4			1	1	1	1	4	2	3	2	2	4	1	11	4	3	44
Santa Cruz				1									1				2			4
Shasta	1	25	32	31	29	28	22	9	7	10	11	26	30	8	8	37	16	16	17	363
Sierra		1				3	2													6
Siskiyou	1	31	35	45	25	25	22	31	9	9	7	1		2	9	14	5	6	3	280
Sonoma			2	4	1	4	1	2		1	4	2	1	2		1				25
Stanislaus			2		1				1		3	1	1		1				3	13
Sutter						1							1							2
Tehama	3	31	19	25	10	22	27	5	4	1	3	6	3	17	18	14	4	14	2	228
Trinity	9	86	34	32	22	15	14	13	4	3	2	12	14	13	21	19	11	16	15	355
Tulare		6	8	11	4	5	3	10	8	8	4	11	17	23	17	22	15	45	9	226
Tuolumne		6	10	5	2	4	1	2	7	11	6	9	12	4	15	13	11	4	1	123
Ventura		1	6	4	6	2		1	7	1	8	2	2	8	4	1	8	15	15	91
Yuba		1			2								1				1	1	4	10
Totals	37	482	361	333	233	275	260	204	162	179	188	214	243	219	256	299	225	285	225	4,680
Male lions, per cent												52	58	52	52	46	52	47	48	51
Female lions, per cent												48	42	48	48	54	48	53	52	49

REPORT ON CATCH OF FUR-BEARING MAMMALS.

Summary Data Furnished by 1,933 Trappers of a Total of 2,984 to Whom Trapping Licenses were Issued for the Season of 1924-1925.

Species	Number	Price average	Estimated value
Skunk	18,811	$1.265	$23,795 91
Raccoon	7,132	3.28	23,392 96
Gray Fox	5,379	1.852	9,961 91
Coyote	5,212	4.412	22,995 34
Wild Cat	3,527	2.24	7,900 48
Civet Cat	2,180	.476	1,037 68
Muskrat	2,022	.463	936 19
Mink	1,987	4.635	9,209 75
Ringtail Cat	1,493	2.018	3,012 87
Kit Fox	817	1.949	1,592 33
Marten	704	10.677	7,516 16
Badger	296	1.578	467 09
Opossum	231	.634	146 45
Weasel	219	.792	173 45
Bear	147	8.50	1,249 50
River Otter	92	12.26	1,127 92
Fisher	44	36.784	1,618 50
Mountain Lion	42	15.80	663 60
Red Fox	29	18.583	538 90
Wolverine	2	10.00	20 00
Totals	50,336		$117,356 99

ESTIMATED VALUE OF CALIFORNIA PELTS, 1924-1925.

Species	Estimated number	Average price per skin	Estimated value
Skunk	29,092	$1.265	$36,721 65
Raccoon	11,006	3.28	36,099 88
Gray Fox	8,301	1.852	15,373 45
Coyote	8,043	4.412	35,485 72
Wild Cat	5,443	2.24	12,192 32
Civet Cat	3,364	.476	1,601 26
Muskrat	3,120	.463	1,444 56
Mink	3,066	4.635	14,310 91
Ringtail Cat	2,304	2.018	4,649 47
Kit Fox	1,261	1.949	2,457 69
Marten	1,086	10.677	11,599 70
Badger	457	1.578	720 15
Opossum	356	.634	225 70
Weasel	338	.792	267 70
Bear	227	8.50	1,929 50
River Otter	142	12.26	1,740 92
Fisher	68	36.784	2,501 31
Mountain Lion	65	15.80	1,027 00
Red Fox	45	18.583	836 24
Wolverine	3	10.00	30 00
Totals	77,724		$181,115 13

The above is an estimate based on reports furnished by 64.8 per cent of the trappers to whom licenses were issued for the season 1924-1925.

Number of trapping licenses issued, 1924-1925 2,984
Number of trappers reporting 1,933

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1924.

(Compiled by the Department of Commercial Fisheries, Fish and Game Commission of California.)

Canned.

Species of fish	Size of cans	Northern California district	Monterey district	San Pedro district	San Diego district	Total
		Cases	*Cases*	*Cases*	*Cases*	*Cases*
Abalone	1-lb.		2,928			2,928
Albacore	1-lb.			35,286	15,847	51,133
	½-lb.			211,440	79,299	290,739
	¼-lb.			32,088	11,812	43,900
Albacore flake	1-lb.			41		41
Bonita	1-lb.			25		25
	½-lb.			4,764	327	5,091
	¼-lb.			7,231		7,231
Fish cake (Kamaboko)	1-lb.			30,109		30,109
Mackerel filet	1-lb. oval			5,229		5,229
Salmon	1-lb. flat	4,456				4,456
	½-lb. flat	11,788				11,788
Sardines	1-lb. oval		631,286	693,133	12,135	1,336,554
	1-lb. tall		488			488
	½-lb. oval		16,162		523	16,685
	½-lb. square		466	515	2,359	3,340
	¼-lb. square		5,788	3,976	53,297	63,061
Sardine paste	¼-lb.			17,864		17,864
Shad	1-lb. tall	1,248				1,248
Shad roe	½-lb. oval	885				885
Squid	½-lb.		3,995			3,995
Steelhead	1-lb. flat	251				251
	½-lb. flat	1,281				1,281
Striped tuna	1-lb.			2,697	456	3,153
	½-lb.			28,671	6,916	35,587
	¼-lb.			12,833	1,394	14,227
Tonno	4-lb.			6,433		6,433
	1-lb.			62		62
	½-lb.			31,401	982	32,383
	¼-lb.			22,155	8,005	30,160
Tuna, bluefin	1-lb.			1,807	30	1,837
	½-lb.			14,904	21	14,925
	¼-lb.			6,180	61	6,241
Tuna, yellowfin	1-lb.			2,630	1,401	4,031
	½-lb.			31,250	4,922	36,172
	¼-lb.			16,170	507	16,677
Tuna, unclassified	1-lb.			1,686		1,686
	½-lb.			9,368		9,368
	¼-lb.			725		725
Tuna flake	1-lb.			802	420	1,222
	½-lb.			4,763	2,092	6,855
Yellowtail	1-lb.			2,180	784	2,964
	½-lb.			8,940	1,284	10,224
	¼-lb.			101		101
Totals		19,909	661,113	1,247,459	204,874	2,133,355

Salted, Smoked and Dried, 1924.

Species of fish	Size or quantity	Northern California district	Monterey Bay district	San Pedro district	San Diego district	Total
Barracuda (dried)	Pounds				42,952	42,952
Bonita (salted)	Pounds			22,407		22,407
(dried)	Pounds				14,450	14,450
Mackerel (salted)	200-lb. barrel			95		95
(dried)	Pounds				1,495	1,495
Sablefish (smoked)	Pounds	288,842				288,842
Salacchini	50-lb. boxes		12,000	9,985		21,985
	20-lb. tins		4,000			4,000
	10-lb. boxes		1,500			1,500
Salmon (mild cured)	Tierces	3,910				3,910
(smoked)	Pounds	152,393				152,393
(hard salted)	200-lb. barrel	35				35
Sardines (mild cured)	800-lb. tierces			625		625
(hard salted)	Pounds			12,500	9,000	21,500
Sea bass, black (dried)	Pounds				31,901	31,901
Sea bass, white (dried)	Pounds				3,885	3,885
Shad (mild cured)	Tierces	162				162
Squid (dried)	Pounds		1,113,054			1,113,054
Tuna (dried)	Pounds				3,216	3,216
Yellowtail (hard salted)	Pounds			4,772		4,772
(dried)	Pounds				111,716	111,716
Mixed fish (dried)	Pounds	136,996				136,996
Miscellaneous Data.						
Fish flour, Tons			236			236
Fish meal, Tons		556	6,045	7,726	1,001	15,328
Fish oil, Gallons		24,949	1,215,347	1,059,001	51,425	2,350,722
Estimated value of pack		$1,168,606	$3,296,815	$8,454,380	$2,066,065	$14,985,866
Number of employees		624	1,099	2,271	1,201	5,195
Number of plants operated		28	15	20	9	72
Value of packing plants		$1,058,081	$1,453,033	$3,664,407	$1,421,623	$7,597,147

CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1925.

(Compiled by the Department of Commercial Fisheries, Fish and Game Commission of California.)

Canned.

Species of fish	Size of cans	Northern California district	Monterey district	San Pedro district	San Diego district	Total
		Cases	*Cases*	*Cases*	*Cases*	*Cases*
Abalone	1-lb.		2,951			2,954
Albacore	1-lb.			43,709	10,984	54,693
	½-lb.			277,331	77,126	354,457
	¼-lb.			37,900	6,863	44,763
Albacore flake	1-lb.				13	13
	½-lb.				21	21
Bonita	1-lb.			79		79
	½-lb.			5,791	570	6,361
	¼-lb.			2,248		2,248
Fish cakes	1-lb. tall			38,682		38,682
Salmon, chinook	1-lb. flat	4,427				4,427
	½-lb. flat	15,304				15,304
	½-lb. tall	4,512				4,512
Salmon, silver	½-lb. tall	416				416
Sardines	1-lb. oval		737,743	920,191	29,846	1,687,780
	½-lb. oval		29,224		185	29,409
	½-lb. square		1,899	482	3,354	5,735
	½-lb. tall			2,203		2,203
	¼-lb. square		5,996		22,656	28,652
Shad	1-lb. tall	6,564				6,564
Shad roe	½-lb. oval	2,160				2,160
Squid	½-lb.		17,949			17,949
Tonno	4-lb.			315		315
	½-lb.			33,010	1,597	34,607
	¼-lb.			26,115	207	26,322
	¼-lb. (100 to case)				7,842	7,842
Tuna, bluefin	1-lb			2,719		2,719
	½-lb.			38,307	141	38,448
	¼-lb.			4,721		4,721
Tuna, flakes	1-lb.			1,029		1,029
	½-lb.			9,456	82	9,538
Tuna, striped	1-lb.			8,563	5,682	14,245
	½-lb.			92,875	46,673	139,548
	¼-lb.			27,995	37,620	65,615
	¼-lb. (100 to case)				338	338
Tuna, unclassified	1-lb.			5,060	1,334	6,394
	½-lb.			33,097	14,040	47,137
	¼-lb.			3,714	2,424	6,138
Tuna, yellowfin	1-lb.			4,298	8,897	13,195
	½-lb.			70,150	58,904	129,054
	¼-lb.			21,438	11,774	33,212
Yellowtail	1-lb.			1,379	204	1,583
	½-lb.			8,530	1,516	10,046
Totals		33,383	795,765	1,721,387	350,893	2,901,428

Salted, Smoked and Dried, 1925.

Species of fish	Size or quantity	Northern California district	Monterey Bay district	San Pedro district	San Diego district	Total
Bloaters	50 count box	2,385				2,385
Mackerel (hard salted)	Pounds			693		693
Sablefish (smoked)	Pounds	179,740				179,740
Salacchini	50-lb. boxes		4,978			4,978
	20-lb. tins		408			408
	10-lb. boxes		1,345			1,345
Salmon (mild cured)	Tierces	3,204	139			3,343
(smoked)	Pounds	2,500				2,500
Sardines (soused)	½-lb. jars (24 to case)		800			800
(salted)	Barrels		10			10
Shad (mild cured)	Tierces	194				194
Shrimps (dried)	Pounds	34,515				34,515
Squid (dried)	Tons		238			238
Mixed fish (dried)	Pounds	143,869			121,532	265,401
(hard salted)	Pounds				84,655	84,655
Miscellaneous Data.						
Fish flour, Tons			258			258
Fish meal, Tons		690	6,415	13,023	2,808	22,936
Fish oil, Gallons		27,568	1,218,993	1,715,633	187,847	3,150,041
Estimated value of pack		$1,013,646	$4,216,167	$11,486,659	$2,743,960	$19,460,432
Number of employees		526	1,344	2,657	1,288	5,815
Value of packing plants		$1,291,690	$1,709,633	$4,223,232	$1,439,814	$8,664,369
Number of plants		31	15	19	10	75

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1924.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Albacore									420	138	12,440,265	30,232	4,809,291	17,280,346	217,537	197,479	415,016
Anchovies							10,718		297,000	3,400	35,833			346,951		495,605	495,605
Barracuda			3				484		138	59,908	3,587,849	45,080	1,040,317	4,733,779	1,899,139		1,899,139
Bluefish								1,127	24,886	82				26,095			
Boccaccio	10						53,324	113,527	426,536	4,615				598,012			
Bonito								146	20	3,786	719,565	1,530	111,135	836,182	133,671	68,516	202,187
Carp		4,368		2,543	15,769	52,405	880							79,565			
Catfish		62,096		2,756	185,746	101,362								351,960			
Chilipepper							57,472	16,818	8,138					82,428			
Cultus Cod	18,981	10,822				198	233,668	23,925	112,838					400,432			
Eels													56	56			
Flounders	13,730	130	12	3,690		9,593	315,567	33,977	675	3	2,069		50	379,496		274	274
Grayfish						2,416	91,190	6,900	824		705		290,599	392,634			
Hake							58,405	2,375						60,780			
Halibut	113,020	13,380	31				6,206	988	9,581	423,983	747,798	92,576	252,852	1,660,415	187,440	861,043	1,048,483
Hardhead					19,023									19,023			
Herring	2,593		5,973			62,950	351,303	530	900	202			11,169	435,620			
Kingfish							2,513	9,353	69,057		294,494	56	8,454	383,927	215	175	390
Mackerel							22	30,496	685,274	20,364	1,954,784	204,967	331,393	3,227,300	5,074	8,160	13,234
Mullet												240	24,256	24,496	3,590	33,885	37,475
Perch	42,900	875	36,567			599	80,034	8,662	16,715	635	89,529	309	12,144	288,969	9,143	7,614	16,757
Pike				173	607	4,115	58							4,953		630	630
Pompano									72		12,650		337	13,059	770	3,750	4,520
Rock Bass										2,323	193,075	27,255	157,967	380,620	20,862	64,726	85,588
Rockfish	13,716	6,751	1,432				439,220	123,848	311,755	25,140	1,610,403	36,987	1,434,373	4,003,625	8,892	23,833	32,725
Sablefish	21,100						353,446	555,642	3,015	107				933,310			
Salmon	2,193,688	687,240	590	499,986	474,638	1,665,486	3,616,455	372,231	504,955					10,015,269			
Sandabs		11,830					1,638,402	40,287	2,072		7,111	130		1,699,832			
Sardines		125	345				1,090,382	285	117,528,599	645	116,955,284	1,480	7,108,813	242,685,958			
Sculpin											78,808	526	29,736	109,070			
Sea Bass—Black										1,911	23,704	11,967	51,095	88,677	12,221	130,506	142,727
Sea Bass—White		1,117	19,846				14,661	14,271	2,979	116,200	619,158	7,978	140,719	936,929	123,245	418,984	542,229
Sea Trout													1,731	1,731		8,600	8,600
Shad				1,048	3,696	20,541	11,236				482			37,003			
Shad—Buck				61,533	19,318	521,890								602,741			
Shad—Roe				98,762	36,248	764,458	5							899,473			

Sheepshead										558	11,613	241	11,015	23,427		840	840	
Skates							121,627	2,075			7,435			131,137				
Skipjack								6,883	30		1,252,318		97,195	1,356,426	1,628,932	795,613	2,424,545	
Smelt	28,076	7,976	31,489			579	124,287	93,541	74,487	30,914	225,945	78,514	19,472	715,280	2,818	3,814	6,632	
Sole	7,116	134,110	28				8,279,015	174,851	90,747	82,764	40,968	5,634	13,147	8,828,380	1,910	5,061	6,971	
Splittail					3,210	461								3,671				
Striped Bass		33	2,157	46,133	100,138	443,655	68,318		1,343					661,777				
Suckers		1,788			297									2,085				
Swordfish											17,808		14,025	31,833				
Tomcod						20	34,017	8,487						42,524				
Trout—Steelhead	87,088													87,088				
Tuna											485,267	134		485,401	61,137		61,137	
Tuna—Bluefin											3,201,703		39,407	3,241,110				
Tuna—Yellowfin											537,221		143,538	680,759	1,777,167	605,472	2,382,639	
Turbot				1,868										1,868				
Whitebait	56,085	172	3,715				62,096	210	205					122,483				
Whitefish										160	189,186		61,317	250,663	2,882	19,532	22,414	
Yellowtail										124	1,224,566	1,672	1,636,650	2,863,012	1,142,992	708,145	1,851,137	
Miscellaneous	3,784	35,800		208	31	1,985	60,345	2,798	59,320	19,271	127,936	7,347	20,208	339,033	5,133	4,322	9,455	
Total fish	2,601,887	978,613	104,056	716,832	858,721	3,652,713	17,175,356	1,644,233	120,232,581	797,233	146,695,532	554,855	17,872,461	313,885,073	7,244,770	4,466,579	11,711,349	
Crustaceans:																		
Crabs	[1]167,112	[2]3,864	[3]1,128			[6]1,392	[7]1,283,016	[9]29,208	[10]21,096					[11]1,506,816				
Shrimps			895,919				655,167							1,551,086				
Spiny Lobsters										52,905	118,371	16,665	106,415	294,356	1,381	731,575	732,956	
Mollusks:																		
Abalones									2,233,665	8,147				2,241,812	5,000		5,000	
Clams—Cockle		924	4,332								1,085			6,341				
Clams—Mixed	12,160	2,686	33,574					150			120	622	67	49,379				
Clams—Pismo									35	293,114				293,149				
Clams—Softshell		2,574	82,104			111,031	47,615							243,324				
Cuttlefish	31		83				7,717	63,104	95,207	50	74		25	166,291				
Mussels						229	7,153		8,545	671		32,625		49,223				
Oysters—Eastern			[4]324,458				[8]202,317							[13]526,775				
Squid									6,779,857		51,172			6,831,029				
Miscellaneous:																		
Terrapins					[5]312									[5]312				
Turtles										51				51				
Totals	2,781,190	988,661	1,445,654	716,832	859,033	3,765,365	19,378,341	1,736,695	129,370,986	1,152,171	146,866,354	604,767	17,978,968	327,645,017	7,251,151	5,198,154	12,449,305	

All amounts shown in pounds unless otherwise specified.

[1] 6,963 dozen. [2] 161 dozen. [3] 47 dozen. [4] 1,474,812 shell oysters. [5] 13 dozen. [6] 58 dozen. [7] 53,459 dozen. [8] 919,625 shell oysters. [9] 1,217 dozen. [10] 879 dozen. [11] 62,784 dozen. [12] 2,394,437 shell oysters.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1925.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican brought into California via San Pedro	Mexican brought into California via San Diego	Total Mexican brought into California
Albacore							20,525	51,575	387,729	4,000	16,718,423	37,594	4,465,096	21,684,942	512,748	9,233	521,981
Anchovies							26,012		1,400		65,659	30,848		123,919			
Barracuda										92,523	5,062,184		790,898	5,945,605	1,631,427	428,569	2,059,996
Bluefish								3,632	31,479					35,111			
Boccaccio	10	67					50,817	210,834	468,109	2,104				731,941			
Bonito							13	1,538	4,487	6,666	618,531	3,868	135,129	770,232	77,675	18,623	96,298
Carp		29,652		1,853	29,588	30,936	2,051						255	94,935			
Catfish		163,239		1,511	143,419	58,110								366,279			
Chilipepper							32,758	124,545	21,342					178,645			
Cultus Cod	18,322	30,843					426,571	59,432	145,430		2,347	185		683,130			
Eels							130			116				246			
Flounders	12,013	35,790	157	3,353		3,414	431,596	106,337	478		966	276	40	594,420			
Grayfish							196,131	850	20		8,675	317	166,339	372,332			
Hake							16,892	5,125						22,017			
Halibut	106,307	44,955	2,917				7,923	2,625	6,136	326,150	690,195	71,163	255,187	1,513,558	168,972	931,331	1,100,303
Hardhead		431			23,137	460								24,028			
Herring	3,222		3,878				843,193	2,125	11	1,480			9,065	862,974		2,800	2,800
Kingfish							3,888	30,215	73,617		417,351	2,027	9,506	536,604		50	50
Mackerel	100						446	4,324	841,440	25,005	1,799,456	250,307	585,025	3,506,103	3,869	12,447	16,316
Mullet											6,419		15,232	21,651		15,156	15,156
Perch	38,504	2,509	47,797				41,412	10,473	21,782	2,100	95,494	2,692	5,710	268,473	1,478	2,400	3,878
Pike				28	3,265	2,471								5,764			
Pompano									60		8,974		77	9,111		1,425	1,425
Rock Bass										61	108,059	13,956	187,985	310,061	3,676	16,548	20,224
Rockfish	37,748	28,589					663,616	150,978	215,110	51,319	1,812,106	23,858	1,555,784	4,539,108	326	3,490	3,816
Sablefish	11,275						418,442	289,502	2,427	3	823			722,472			
Salmon	3,795,062	582,194	18	485,420	503,731	1,789,695	1,270,918	244,673	854,042					9,525,753			
Sandabs		25,550					1,643,353	269,844	3,230	180	10,256	434		1,952,847			
Sardines			290				463,892		124,756,314	413	174,403,208	1,705	15,669,164	315,294,986			
Sculpin							125	52	3,175	63	196,407	3,925	22,709	226,456			
Sea Bass—Black										1,433	23,282	17,773	60,416	102,904	4,696	81,472	86,168
Sea Bass—White		29	9,067				46,989	5,347	1,228	81,584	563,770	16,027	163,615	887,656	370,254	603,509	973,763
Sea Trout							75				1,367		1,414	2,856		20,909	20,909
Shad				1,888	4,655	20,418	46,317				285			73,563			
Shad—Buck				131,029	37,792	788,741	515							958,077			
Shad—Roe				191,860	45,648	1,167,052	3,526							1,408,086			

Sheepshead										5,404	23,212	234	18,898	47,748	70	993	1,063	
Skates		650					156,328	17,452			8,840	144	70	183,484				
Skipjack							1,344	7,768	3,524		6,262,942	5,137	2,487,399	8,768,114	3,182,899	2,284,076	5,466,975	
Smelt	30,784	8,689	22,298			1,687	86,262	97,091	45,515	81,615	271,557	85,542	18,758	749,798	472	1,399	1,871	
Sole	2,375	255,422				215	6,845,578	1,409,757	52,249	150,886	28,511	3,997	7,348	8,756,338	3,190	3,007	6,197	
Splittail					6,412	145								6,557				
Striped Bass			1,415	80,079	177,231	495,027	83,964		57					837,773				
Suckers		4,972			100	25	612							5,709				
Swordfish											8,023		17,589	25,612		1,433	1,433	
Tomcod			94				12,539	1,875						14,508				
Trout—Steelhead	222													222				
Tuna											384,333	1,130		385,463	41,390		41,390	
Tuna—Bluefin											3,764,940	556	38,181	3,803,677				
Tuna—Yellowfin											2,841,074	138	122,408	2,963,620	5,947,255	4,327,023	10,274,278	
Turbot		65	3,361				500							3,926				
Whitebait	38,017		4,845				28,106							70,968				
Whitefish										1,360	134,715	160	83,195	219,430	222	2,460	2,682	
Yellowtail										476	1,351,658	911	1,233,576	2,586,621	318,767	274,503	593,270	
Miscellaneous	559	15,081		201	55	248	9,722	9,859	14,491	20,808	132,267	12,362		215,653	14,810	235	15,045	
Total fish	4,094,520	1,228,727	96,137	897,222	975,033	4,358,644	13,883,681	3,117,828	127,954,882	855,749	217,826,309	587,266	28,126,068	404,002,066	12,284,196	9,043,091	21,327,287	
Crustaceans:																		
Crabs	[1]183,744	[2]13,200	[3]3,072				[5]2,959,728	[7]63,456	[8]11,112					[9]3,234,312				
Shrimps			868,065				592,169							1,460,234				
Spiny Lobsters										66,768	215,009	11,624	138,658	432,059	19,363	1,034,984	1,054,347	
Mollusks:																		
Abalones									2,336,760	16,101				2,352,861	802		802	
Clams—Cockle		482	2,509											2,991				
Clams—Mixed	17,724	6,646	35,903						120	445		47	879	61,764	75		75	
Clams—Pismo									60	323,185				323,245				
Clams—Softshell		822	92,076			113,151	58,007							264,056				
Cuttlefish	32	49	99				15,568	24,989	92,461	43	138	15		133,394	55		55	
Mussels							21,363		3,295	334		950		25,942				
Oysters—Eastern			[4]50,717				[6]518,286							[10]569,003				
Oysters—Native			165											165				
Squid							492		1,827,416		44,867		18,445	1,891,220				
Miscellaneous:																		
Turtles															21		21	
Totals	4,296,020	1,249,926	1,148,743	897,222	975,033	4,471,795	18,049,294	3,206,273	132,226,106	1,262,625	218,086,323	599,902	28,284,050	414,753,312	12,304,512	10,078,075	22,382,587	

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.

[1] 7,656 dozen.
[2] 550 dozen.
[3] 128 dozen.
[4] 230,535 shell oysters.
[5] 123,322 dozen.
[6] 2,355,853 shell oysters.
[7] 2,644 dozen.
[8] 463 dozen.
[9] 134,763 dozen.
[10] 2,586,388 shell oysters.

REPORT ON FISH CANNERIES.

N. B. SCOFIELD,
In Charge Department of Commercial Fisheries,
Fish and Game Commission.

SIR: I beg to submit herewith a report on cannery activities for the past sardine season in California extending from June 1, 1925, to May 31, 1926.

The first canning operations were started at Monterey in June, 1925, and the last cannery closed down in April, 1926.

Canning operations were started in the San Pedro District in October, 1925, and extended to April, 1926, although most of the plants closed down in both Monterey and San Pedro in March. In San Diego the plants started in January and ran through to April 1, 1926. No fish was received in April but a small quantity was received by some of the plants during May.

The following table shows the activities at the various canning centers:

CANNERY, FISH FLOUR AND EDIBLE OIL PLANT PRODUCTION.

Season June 1, 1925, to May 31, 1926.

District	Cases 1-lb. oval cans per ton	Tons fish received	Tons fish used for canning	Tons fish used for meal and flour	Tons offal	Cases 1-lb. ovals packed
Monterey	15.6	69,011	48,587	19,832	16,193	937,014
San Pedro	16.3	61,992	49,192	12,800	16,643	968,495
San Diego	16	5,214	3,940	1,274	1,312	66,074
Northern California	16	248	194	54	65	3,892
Totals, all districts	15.9	136,465	101,913	33,960	34,213	1,975,475
Deduct fish used for other purpose		8,247	Add other sizes, 1-lb. ovals			65,382
Fish used by canning plants		128,218	Equal to total cases, 1-lb. ovals			2,040,857

District	Cases other sizes packed	Other sizes equivalent to cases of 1-lb. ovals	Meal, tons	Ratio per ton, meal	Oil, gallons	Gallons oil per ton of offal and fish	Tons of fish used for other purposes
Monterey	37,220	35,956	[1]6,393	5.7	1,110,983	30.8	[2]6,248
San Pedro	16,492	16,361	5,962	5	658,817	22.4	[3]1,729
San Diego	16,373	13,065	467	5.5	43,995	17	[4]270
Northern California			20	5.5	2,629	24.1	
Total, all districts	70,085	65,382	12,842	5.3	1,816,424	26.6	8,247

[1] 262 tons fish flour produced, not included in meal production.
[2] 592 tons used for salting purposes; 4,468 tons used for manufacturing fish flour; 1,188 tons used for manufacturing edible oil.
[3] 1,729 tons used for manufacturing edible oil.
[4] 270 tons used for manufacturing edible oil.

It is useless to comment on this table as a close study of it will show that the canneries located at each of the canning centers have produced over the requirements of General Order No. 1 of 15 cases of one-pound oval cans or equivalent number of cases of other size cans from each ton of fish received.

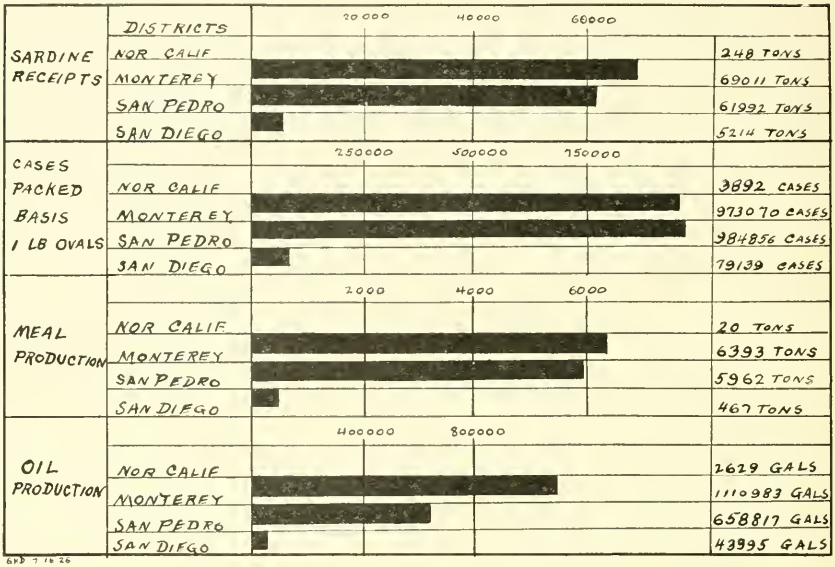
The meal ratio is based on the number of tons of offal and whole fish required to produce one ton of meal.

There seems to be considerable difference in the amount of meal and oil produced from a ton of fish and offal in various plants as will be shown in the following table of operations of each plant. There is also shown in this table the number of cases of one-pound oval cans or the equivalent thereof produced from each ton of fish received.

TABLE OF CASE PRODUCTION, RATIO OF MEAL AND OIL PRODUCTION,

Name of plant	Location	Kind of plant	Number of cases 1-lb. oval cans per ton	Ratio per ton of meal	Gallons of oil per ton of offal and fish
F. E. Booth Company	Pittsburg	Cannery	16	5.5	24.1
Bayside Fish Flour Company	Monterey	Fish flour		6.4	29.9
F. E. Booth Company	Monterey	Cannery	16.4	5	32.5
Carmel Canning Company	Monterey	Cannery	15.9	5.3	36.2
E. B. Grosse	Monterey	Cannery	15.4	5.1	33.3
Monterey Canning Company	Monterey	Cannery	14.7	6.1	21.6
California Packing Corporation	Monterey	Cannery	15.7	6.9	22.3
San Xavier Packing Company	Monterey	Cannery and salting	14	4.4	37.8
Sea Pride Canning Company	Monterey	Cannery	15.8	5.4	31.6
Hauser Packing Company	Monterey	Edible oil		5.4	32.5
K. Horden Company	Monterey	Cannery	14.9	5	34
Coast Fishing Company	Wilmington	Cannery	17.9	5.1	24
Franco-Italian Packing Company	East San Pedro	Cannery	15.2	6.3	22.5
French Sardine Company	East San Pedro	Cannery	18	3.2	28.8
Gilbert C. Van Camp	San Pedro	Cannery	9.6	4.6	29.8
Italian Food Products Company	Long Beach	Cannery	15.6	Scrap sold	22.4
Los Angeles Sea Food Company	East San Pedro	Cannery	16.9	4.6	24
Pacific Marine Products Company	East San Pedro	Cannery	11.1	5.6	14.2
Kittle-Joerissen Canning Company	East San Pedro	Cannery	8.6	6	.02
Southern California Fish Corporation	East San Pedro	Cannery	15	5.6	23.5
Seacoast Packing Company	East San Pedro	Cannery	16.5	5	21.2
Stafford Packing Company	Wilmington	Cannery	15.2	4.2	25
Toyo Fisheries Company, Inc.	Wilmington	Cannery	16.2	5.8	18
Van Camp Sea Food Corporation	East San Pedro	Cannery	16.8	5.1	20.7
Globe Oil Mills	Ostend	Edible oil		5.3	19
Cohn, Hopkins Company	San Diego	Cannery	15.7	4.6	25
K. Hovden Company	San Diego	Cannery	14.9	5.4	22.4
Neptune Sea Food Company	San Diego	Cannery	15.2	5.5	22.4
California Packing Corporation	San Diego	Cannery	20.7	Sold	offal
San Diego Packing Company, Inc.	San Diego	Cannery	12.3	7.4	10.7
Van Camp Sea Food Corporation	San Diego	Cannery	12.3	5	18.8
Westgate Sea Products Company	San Diego	Cannery	17.3	5.7	16.2
Hauser Packing Company	San Diego	Edible oil		5.6	20.4

For quick reference and comparison of activities in the Monterey, San Pedro and San Diego districts a chart is attached hereto showing receipts of fish, number of cases packed on the basis of one-pound oval cans, number of tons of meal, and gallons of oil produced.



Graphic comparison of Fish Receipts, Pack, Meal and Oil Production. California Sardine Season, 1925-1926.

This report does not cover the operations of the Monterey Fish Products Plant which took sardines in their reduction plant at Monterey during the early part of the season in violation of the Fish Reduction Act and were later closed for three months by a court order.

Respectfully submitted.

S. H. Dado,
Assistant, Department of Commercial Fisheries.

San Francisco, July 16, 1926.

STATEMENT OF EXPENDITURES FOR THE PERIOD JULY 1, 1924, TO JUNE 30, 1925, OF THE SEVENTY-SIXTH FISCAL YEAR.

	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration—					
Commissioners			$946 59		$946 59
Executive offices	$440 86	$17,099 09	5,528 61	$491 54	23,560 10
Printing	8,415 40				8,415 40
Research and publicity	301 20	5,903 89	1,293 90	138 58	7,637 57
Accident and death claims			4,452 22		4,452 22
Total administration	$9,157 46	$23,002 98	$12,221 32	$630 12	$45,011 88
Commercial Fish Culture and Conservation—					
Superintendence	$1,016 51	$9,535 45	$3,435 98	$6 75	$13,994 69
Inspection and patrol	5,281 76	17,288 97	4,561 48	130 23	27,262 44
Research	2,200 01	15,648 81	3,989 47	751 58	22,589 87
Statistics	563 93	5,948 70	202 09		6,714 72
Propagation and distribution of salmon	10,753 02	14,793 95	1,202 01	535 15	27,284 13
Total commercial fish culture and conservation	$19,815 23	$63,215 88	$13,391 03	$1,423 71	$97,845 85
Sporting Fish Culture—					
Superintendence	$100 74	$10,260 32	$2,818 68	$78 53	$13,258 27
Special field investigations	230 52	2,365 32	861 47	805 41	4,262 72
Printing	152 75				152 75
Propagation and distribution of trout	36,206 55	60,042 69	11,578 78	13,597 20	121,425 22
Total sporting fish culture	$36,690 56	$72,668 33	$15,258 93	$14,481 14	$139,098 96
Patrol and Law Enforcement—					
Prosecutions and allowances			$66 57		$66 57
General patrol	$2,558 46	$141,011 35	93,104 07	$1,162 35	237,836 23
Total patrol and law enforcement	$2,558 46	$141,011 35	$93,170 64	$1,162 35	$237,902 80
Fish and Game Conservation—					
Game bird introduction	$1,812 30	$1,708 99	$4,955 46		$8,476 75
Game farm			16 69		16 69
Mountain lion hunting		1,500 00	870 77		2,370 77
Mountain lion bounties			6,100 00		6,100 00
State fair exhibit	298 33	1,006 00	2,079 57		3,383 90
Total fish and game conservation	$2,110 63	$4,214 99	$14,022 49		$20,348 11
License commissions			$47,297 40		$47,297 40
Tahoe camp grounds	$118 20	$602 00	16 66		736 86
Total expenditures	$70,450 54	$304,715 53	$195,378 47	$17 697 32	$588,241 86
Prior year expenditures					$1,062 80

STATEMENT OF EXPENDITURES FOR THE PERIOD JULY 1, 1925, TO JUNE 30, 1926, OF THE SEVENTY-SEVENTH FISCAL YEAR.

	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration—					
Commissioners	$3 37		$191 39	$80 05	$274 81
Executive and legal	104 54	$10,047 97	1,652 64	349 95	12,155 10
Clerical and office	760 26	17,267 33	1,885 44	3,231 42	23,144 45
Rent			9,336 96		9,336 96
Printing	6,630 15				6,630 15
Postage			2,953 95		2,953 95
Freight, cartage and express			1,281 63		1,281 63
Telephone and telegraph			3,472 09		3,472 09
Automobile	193 94		131 35	1,775 88	2,101 17
Accident and death claims			4,087 99		4,087 99
Total administration	$7,692 26	$27,315 30	$24,993 44	$5,437 30	$65,438 30
Publicity and Research—					
Director of education and research	$3,256 93	$4,223 95	$1,732 59	$909 20	$10,122 67
Director of publicity	20 19	2,436 25	373 72	4 75	2,834 91
Printing	3,458 65				3,458 65
Total publicity and research	$6,735 77	$6,660 20	$2,106 31	$913 95	$16,416 23
Conservation and Protection—					
Patrol and law enforcement:					
Chief and assistant		$4,563 24	$603 75		$5,166 99
Captains and deputies	$1,470 47	132,888 91	93,429 19	$590 75	228,379 32
Patrol launches	1,040 20	2,382 33	856 24	116 50	4,395 27
Clerical and office	53 73	4,510 00	5 00		4,568 73
Rent			420 34		420 34
Automobiles	440 60		194 71	17 05	652 36
Protection:					
Lion hunting		1,500 00	839 72		2,339 72
Lion bounties			5,630 00		5,630 00
Total conservation and protection	$3,005 00	$145,844 48	$101,978 95	$724 30	$251,552 73
Commercial Fisheries—					
Chief and assistants	$368 78	$5,203 32	$815 43	$5 97	$6,393 50
Deputies	376 90	22,486 09	4,168 89	66	27,032 54
Laboratory and research	1,430 68	16,035 89	2,845 21	814 42	21,126 20
Statistical	670 48	5,815 26	297 31	99	6,784 04
Patrol launches	2,566 91	2,422 26	495 36	5,905 45	11,389 98
Salmon tagging	800 00		73 65		873 65
Total commercial fisheries	$6,213 75	$51,962 82	$8,695 85	$6,727 49	$73,599 91
Game Propagation—					
Game farm maintenance and operation	$8,535 76	$3,736 89	$3,384 89	$3,865 56	$19,523 10
Game farm additions and betterments				28,701 34	28,701 34
Total game propagation	$8,535 76	$3,736 89	$3,384 89	$32,566 90	$48,224 44
Fish Culture—					
Chief of division		$3,683 32	$225 38		$3,908 70
Special field investigations	$239 08	9,037 73	1,610 23	$870 23	11,757 27
Clerical and office	111 38	4 102 72	19 90	3 50	4,237 50
Printing	88 95				88 95
Hatcheries maintenance and operation	62,595 51	75,643 75	8,357 22	1,838 64	148,435 12
Hatcheries additions and betterments				9,587 97	9,587 97
Automobiles	1,047 79		890 64	3.202 52	5,140 95
Rent			836 60		836 60
Total fish culture	$64,082 71	$92,467 52	$11,939 97	$15,502 86	$183,993 06
License commissions			$48,791 10		$48,791 10
Total expenditures	$96,265 25	$327,987 21	$201,890 51	$61,872 80	$688,015 77

Comparative Balance Sheets at Beginning and End of Each of the Seventy-sixth and Seventy-seventh Fiscal Years.

	July 1, 1924	June 30, 1925	June 30, 1926
Debits			
Available appropriated funds	$11,630 49	$24,044 19	$157,288 55
Warrants receivable	67,327 79	49,282 46	43,550 17
Cash, state	17,911 75	57,189 08	77,245 27
Fish and game preservation fund	209,345 47	197,831 16	253,769 69
Accounts receivable	115 18	22,175 91	2 10
Bond deposits (licenses sold to agents)	71,670 00	118,102 00	66,508 00
Unissued licenses available	532,422 00	679,845 00	618,213 50
County clerks' unissued license supplies	292,967 00	300,539 00	303,869 00
Fish tags available	3,261 41	4,262 52	3,240 86
Game tags available	320 13	243 29	203 27
Revolving fund appropriated			12,500 00
Unclaimed trust moneys			259 45
Total debits	$1,206,971 22	$1,453,514 61	$1,536,649 86
Credits			
Appropriations for support	$1,012 92	$10,605 16	$10,669 10
Appropriations for salaries		102 00	275 01
Deficiency appropriations	10,617 57	13,337 03	146,344 44
Claims filed	67,327 79	49,282 46	43,550 17
Accumulated excess income	227,372 40	277,196 15	343,517 06
Liability for bond deposit	71,670 00	118,102 00	66,508 00
Accountability for licenses	825,389 00	980,384 00	922,082 50
Accountability for fish tags	3,261 41	4,262 52	3,240 86
Accountability for game tags	320 13	243 29	203 27
Income suspense			
Liability for canceled checks			259 45
Total credits	$1,206,971 22	$1,453,514 61	$1,536,649 86

Comparative Statement of Income for the Fiscal Years 1924-1925 and 1925-1926.

	Seventy-sixth fiscal year, 1924-1925	Seventy-seventh fiscal year, 1925-1926
License sales—		
Angling	$179,846 00	$307,302 00
Hunting	236,632 00	235,610 00
Market fishermen's	43,450 00	54,321 00
Trapping	2,875 00	3,700 00
Wholesale fish packers' and shell fish dealers'	1,195 00	1,365 00
Game breeders'	325 00	377 50
Fish breeders'	65 00	95 00
Kelp	20 00	20 00
Total license sales	$464,408 00	$602,790 50
Other income—		
Court fines	$45,654 00	$52,714 75
Fish packers' tax	105,100 79	83,200 15
Kelp tax		2 26
Fish tag sales	5,998 89	5,022 53
Game tag sales	76 84	57 02
Abalone inspection		210 43
Crawfish inspection	300 00	
Interest on bank deposits	1,895 09	2,762 27
Sales of nets and lines	15 80	491 00
Sales of beaver hides	345 00	10 00
Sale of launches	300 00	50 00
Total other income	$159,686 41	$144,520 41
Total income	$624,094 41	$747,310 91

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	27	28
Adm	72,146.56	85723,81
Educ	9326,79	23,335,91
		11,428,20 34764.11
Publick	6880,43	5714.49
Cons & S	306,884,64	415,529,35
Comm T.	101,097,94	122,987,02
Tele Coll	254 966,59	309.861,11
SC & Sod.	11,607,33	11577,27
Game P.	19967,79	20,878,95
S Comm	53581,90	45,292,35
	836,459,97	1052,328,46